OPERATION AND MAINTENANCE MANUAL

FM/AM-1000/A

CAUTION

The ANT Connector is used for "over the air" testing only. Do not connect a transmitter to this input.

Maximum ON time for measurement of transmitter output using the TRANS/RCVR connector is:

10 sec at 100W, 15% duty cycle.
20 sec at 50W, 30% duty cycle.
2 min at 30W, 50% duty cycle.

Do not connect transmitter to the 10 MHz REF OUTPUT Jack. Damage to the 10 MHz Ref. Oscillator will result.

If the test set is connected to a vehicle's d.c. supply, unplug the test set while starting the engine. If this is not done a blown fuse or other problems may result.

Do not exceed 200V into the SCOPE Input connector. Voltages over 200V will damage the scope circuitry.

Remove any possible static charge from an unterminated antenna before connecting to unit. To do this short the center conductor to the shield briefly.

Do not attempt to force the attenuator dial past the stops. Internal damage to the attenuator will result.

FM/AM 1000A

COMMUNICATIONS SERVICE MONITOR

MANUAL PART NUMBER: 1-23-0610

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FM/AM-1000A

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FM/AM-1000A

SPECIFICATIONS

SIGNAL GENERATOR

Frequency Range: Frequency synthesized type - 100Hz to 999.9999 MHz in 100Hz phase-locked increments. Ovened-crystal master oscillator provides an accuracy of .00005% of selected output frequency after 20 minutes warm-up from oven off condition. Oven operates continuously with ac line connected; optionally on battery power with the set turned off. Aging stability is 2 to 3 PPM per year during the first year and 1 PPM per year thereafter.

Internal Modulation: Frequency synthesized tone generator; 5Hz to 9999.9Hz in 0.1Hz increments. Accuracy is controlled by the master oscillator. Front panel connector provides convenient modulation tones output. AM variable 0-90% 10Hz to 5 kHz with 70% maximum from 5 kHz to 10 kHz. Low frequency FM response facilitates swept receiver I.F. alignments when used in conjunction with internal scope.

External Modulation: Front Panel connector allows external modulation input to the generators. 6.0V (± 2V) P-P produces ± 15kHz deviation through the modulating frequency range 2Hz to 15 kHz. 3.0V (± 1V) P-P produces 100% AM.

Simultaneous Modulation: Generator may be modulated simultaneously from internal and external sources and internal tone generator may be externally keyed for sequential tone coding.

Quieting: 42dB below 3.3 kHz deviation at 1 kHz.

Output Power: Continuously variable from -133 dBm to -33 dBm (0.05µV to 5000µV) subject to attenuator accuracy.

Attenuator Accuracy: ±2.5 dB up to 400 MHz
±3.0 dB 400 MHz to 999.9999 MHz

GENERAL SPECIFICATIONS

RECEIVER

Frequency Range:	1 to 999.9999 MHz.
Sensitivity:	Better than 2μV, (typically 1μV) for "off-the-air" transmitter frequency checks. Sensitivity is reduced below 800 kHz.
Internal Cross-Feed Signal:	With the last four digits of the Frequency Select Switch set to zero e.g. 111.0000 MHz, Internal Cross-Feed Signal is less than 2.0μV as measured on 111.0000 MHz. This cross-feed signal is used to calibrate the frequency of the FM/AM-1000A by zero beating with NBS station WWV.
Quieting:	Deviation measurements can be made down to 0.1 kHz.
Bandwidth:	Narrow; RCVR ± 7 kHz, Detector Audio bandwidth is 8 kHz. Mid; RCVR ±100 kHz, Detector Audio bandwidth is 8 kHz. Wide; RCVR±±100 kHz. Detector Audio bandwidth is 80 kHz.
Monitoring:	Frequency error and deviation simultaneously displayed on the scope and meters. AM modulation percentage information displayed using scope 250 kHz I.F. envelope.
Auto Zeroing:	Frequency error meter is automatically zeroed every 1.5 seconds during a 3ms time period. AUTO Zeroing may deleted with AUTO- ZERO/BATT switch.
Beat Frequency Oscillator:	Variable injection level for calibrated signal strength measurements from 2 microvolts to 5,000 microvolts; frequency variable ±1.5 kHz. Also enables single-sideband and C.W. monitoring.
Antenna Input Protection:	Built in static discharge protector for antenna jack.
Certification:	The receiver model number FM/AM-1000A is capable of complying with the requirements of Part 15, subpart C of the FCC Rules and Regulations under normal operation.

POWER MEASUREMENTS

Range:	0 to 10 and 0 to 100 Watts read directly on a front panel meter to an accuracy of ±10% full scale to 225 MHz. See operation instructions for duty cycle and on-time limitations.

TONE FREQUENCY MONITORING

Measurement Techniques:	Precision internal tone generator is selectable with the scope timebase switch to produce a Lissajou scope pattern from a received tone, enabling accuract "off-the-air" tone frequency measurements.

OSCILLOSCOPE

3dB Bandwidth:	Ac or dc inputs. 1 MHz with external vertical dc input at one half full deflection

PHYSICAL CHARACTERISTICS

Power:	Conveniently portable with self contained battery that automatically recharges when ac line is connected. Battery operation typically is 1 hour with the scope off and 40 minutes with the scope on before recharge is required. Operates on 110/230V ac 50-400Hz, 80 Watts, and 11 to 28V dc. Typical dc currents 4.3 A at 12V and 1.85A at 28V.
Size:	8" (20.32 cm) high, 13.5" (34.29 cm) wide, 18.5" (46.99 cm) deep. Weight 40 lbs (18.2 kg). Rugged all metal construction, designed for field and bench use.
Fan:	Thermostatically controlled fan, switches on when reaching 95°F. (35°C).

Functional Description of Front Panel Controls, Indicators, and Connectors

Refer to Figure 1-1

1. Power Switch. When depressed on the left side (PWR), the Test Set is powered by external dc or ac power and the ON lamp lights. When returned to the center position (OFF), power is removed from all systems except the master oscillator oven and battery charger (see paragraph 4). When momentarily depressed on the right side (BATT), the Test Set is powered by the internal rechargable batteries and the ON lamp lights. Press again to turn off.

   In the BATT mode, the Test Set will automatically turn off after approximately eight minutes as battery-saving feature. Depress the switch to the right momentarily to recycle the timer. The batteries are charged whenever the line cord is plugged in whether or not the Test Set is on.

2. TRANS/RCVR Connector. A 50 ohm input/output connection for the transceiver under test. Maximum transmitter input is 30W at 50% duty cycle and 100W at 15% duty cycle or 15W cw (uninterrupted) CAUTION! Maximum ON time is 10 seconds at 100W, 20 seconds at 50W, and 2 minutes at 30W.

3. AUTO ZERO/BATT switch. This is a dual purpose switch. In the AUTO position, the Auto zeroing circuit is operational and not operational in the OFF (center) position. The switch should be in the OFF position if the Auto-Zeroing reference pulse is objectionable in the audio system or visual displays. When the FM/AM-1000A is used as a demodulator to feed decoding equipment, the AUTO-ZERO/BATT switch must be OFF (center position) or data will be lost during the 3ms reference pulse time period. Frequency error measurements should not be relied upon for more than a few seconds after AUTO ZERO/BATT switch is positioned to OFF. Before making frequency measurements, return switch to AUTO position for correct meter reference. The switch may be held in the spring-loaded BATT position for a voltage check. The battery charge is adequate when the right-hand meter indicates in the green band.

4. BATT OVEN Switch. When ON, powers the master oscillator oven from the batteries so the oven temperature can be stabilized when the Test Set is in transit.

5. OVEN Lamp Indicates whether the master oscillator oven is approaching temperature (lamp bright), or stabilized at final temperature (lamp dim), or oven power off (lamp off).

6. RF LEVEL/BFO INJECTION - µV Control. When Test Set is in signal generator (GEN) mode (see paragraph 10), controls the RF level into a 50 ohm load in either µV into 50 ohm, or dBm. When in receiver mode (RCVR), controls beat frequency oscillator (BFO) injection level into receiver for making signal strength measurements of a remote transmitter (see paragraphs 20 and 36).

7. ANT Connector. Connection for external antenna for "over-the-air" testing. DO NOT connect a transmitter to this input.

   NOTE! No antenna may be required if a transmitter is radiating at a small distance from the Service Monitor. Verify that the "SIG" Meter does not go past full scale, indicating too high a signal level, because erroneous data may be obtained with an input signal overload.

8. INPUT LEVEL Lamp. When lighted, indicates that the squelch is open. An internal static discharge protection circuit provides protection for most antenna transients.

9. DEV/PWR Meter Function Switch. In 2, 6, or 20 kHz full scale positions, right-hand meter indicates peak FM deviation of the received signal when the Test Set is in FM RCVR (receiver) or peak FM deviation of the Test Set's signal generator in FM GEN (generator) mode. In X1 or X10 watts positions, meter indicates power of the transmitter under test connected to TRANS/RCVR jack. In SIG (received signal strength) position, the meter indicates the relative signal strength of the received signal at the ANT connector.

10. GEN/RCVR Mode Switch. In GEN (signal generator) position, a RF signal is produced at the TRANS/RCVR jack. Its level is set by the RF LEVEL μV control, frequency by the FREQUENCY MHz thumbwheel, modulation type by the AM/FM switch, internal modulation frequency by the MODULATION FREQ Hz thumbwheel, and modulation level by the INT MOD (internal modulation) level control. The modulation depth or deviation is set up using the peak deviation (DEV/PWR) meter or the oscilloscope in FM mode or the oscilloscope and DEMOD OUT jack in AM mode (see paragraph 25).

    In RCVR (receiver) position, the Test Set acts as a receiver measuring the power, frequency, peak FM deviation, and sub-audible tone frequencies of the transmitter under test connected to the TRANS/RCVR jack. The above measurements excluding power and including received signal strength can also be made for remote transmitters monitored at an antenna connected to the ANT jack. The AM modulation depth of the transmitter under test can be displayed on the scope. Note: the Test Set will automatically be placed in the RCVR mode upon application of greater than 3W of RF power at the TRANS/RCVR connector.

11. ZERO RCVR Control. Zeroes the Frequency Error meter when GEN/RCVR switch is in GEN position. (Not a normal operating control).

12. 10 MHz REF OUT Connector. Output for measuring the frequency of the master oscillator.

13. 10 MHz CAL Screwdriver Adjustment. A fine adjustment of the frequency of the master oscillator.

14. NARROW/MID/WIDE Bandwidth Switch.
Detector Audio bandwidth is 8 kHz. Narrow - RCVR ± 7 kHz.
Detector Audio bandwidth is 8 kHz. Mid - RCVR ± 100 kHz.
Detector Audio bandwidth is 80 kHz. Wide - RCVR ±100 kHz.

15. EXT SPKR Connector. Connector for external speaker. Internal speaker is disconnected when a plug is inserted in this jack.

16. SQUELCH Control. Squelch control for internal RCVR except in GEN mode.

17. INT MOD/RCVR Switch. In RCVR (receiver), connects the speaker to the receiver output; in INT MOD (internal modulation), connects speaker to the internal modulation synthesizer.

18. VOL (Volume) Control. Controls level to internal or external speaker.

19. FREQUENCY MHz Thumbwheel. Selects the signal generator or receiver frequency.

20. BFO/OFF Control. When out of the detent (OFF) position, controls the frequency of an internal Beat-Frequency Oscillator (BFO) used in reception of CW, SSB, or DSB/SC modulation. When the BFO is on, the RF LEVEL/BFO INJECTION control can be used to measure the received signal strength at the ANT jack by adjusting this control until the peak of the beat between the BFO and the signal to be measured just goes to zero amplitude on the oscilloscope I.F. display. Place AM/FM switch to AM and RCVR/GEN to RCVR for this measurement.

21. AM/FM Switch. For this switch in AM and RCVR/GEN in RCVR position, the receiver's AM detector output is heard through the speaker and the 250 kHz I.F. signal is connected to the oscilloscope when its vertical sensitivity switch is in any of the kHz positions. For GEN mode, the INT (or EXT) MOD signal is connected to signal generator's AM modulator.

    For FM position, the receiver's FM demodulation output is heard through the speaker and is connected to the vertical input of the oscilloscope with full scale sensitivities of 1.5, 6, 15 kHz.

    For the FM mode, the peak deviation meter measures the FM deviation of the received signal or signal generator.

22. EXT MOD Connector. External modulation input connector. The input connection is made using a standard 3 conductor ¼" phone plug.

    The "Ring" connection is for external modulation, and the "tip" is for External Keying. For typical External Modulation levels, consult the SPECIFICATIONS sheet. In the External Keying mode, the Internal Tone Generator is ON when the connection is open and OFF when the Connection is grounded.

23. DEMOD OUT Connector. AM detector or FM demodulator output.

24. INT MOD OUT Connector. Internal modulation oscillator output. Level is controlled by INT MOD control.

25. INT MOD Control. Controls the AM depth of modulation or FM peak deviation. The AM depth can be set by connecting an ac voltmeter to the DEMOD OUT jack and noting the voltmeter reading (reference level) when the 250 kHz I.F. display on the oscilloscope is adjusted for 100% AM. The desired modulation is then set by adjusting the modulation level control until the DEMOD OUT is the desired percent times the reference voltage level measured above. Example: if 100% modulation corresponds to 3.0 volts at DEMOD jack, then 30% would correspond to 1.0V.

26. MODULATION FREQ Hz Thumbwheel. Selects the frequency of the internal modulation synthesizer.

27. SCOPE IN Connector. External vertical input for oscilloscope.

28. SWEEP Control. Controls oscilloscope horizontal sweep speed in 10, 1, .1ms/div or 10us/div rates. Since sweep is synchronized (as opposed to triggered) to the vertical signal, the small vernier control may have to be taken out of CAL to obtain a stable display.

    The extreme ccw position of the switch connects the internal modulation oscillator to the oscilloscope horizontal input to display the Lissajou pattern between a received signaling tone and the internal oscillator for tone frequency measurements.

29. AC/DC/OFF Switch. In OFF, disconnects power from the oscilloscope to conserve the batteries when so powered. In ac or dc applies internal power to the scope and ac or dc couples the scope inputs. It is necessary to pause in the off position to insure scope power supply inverter will start.

30. Oscilloscope Vertical Sensitivity Switch. On the kHz ranges, selects the sensitivity for the display of the output of the FM demodulator for measuring peak deviation of a received signal or setting up the signal generator's FM modulation. On EXT V/DIV ranges selects the sensitivity of the external input.

31. Frequency Error Range Switch. Selects the full scale sensitivity of the frequency error meter.

32. HORIZ Control. Adjusts the oscilloscope trace horizontal position.

33. VERT Control. Adjusts the oscilloscope trace vertical position.

34. FOCUS Control. Adjusts the oscilloscope trace focus.

35. INTENSITY Control. Adjusts the oscilloscope trace intensity.

36. RF Level BFO Injection-uV Control Dual Range Switch. The FM/AM-1000A, RF level control system has provisions for two output ranges. One range provides the output level indicated by the RF Level/BFO injection/uV control dial; the other range adds 40dB to the dial reading when selected. The outer (μV) dial on the RF Level/BFO injection/uV control reads from .05 to 50, the inner (-dBm) dial reads 80 to 130. The range selector switch is labeled "μv x 100", "+40dB" and "NORM".

The dual range RF level control system has a fixed attenuator and solid state switch module mounted on the second mixer assembly. This attenuator switch is connected to the output port of the RF level control to provide the two output ranges.

Because the selectable fixed attenuator is connected to the output port of the RF level control, the output level is either that shown on the dial or increased by 40dB depending upon the position of the range selector switch. If the +40dB range is selected, the operator must algebraically add 40dB to the -dBm setting on the dial. For example, if -80dBm is shown on the attenuator dial and the +40dB range is selected, the actual output level becomes -80dBm +40dB = -40dBm.

The microvolt scale is simplier to use. In the +40dB range, multiply the microvolt dial reading times 100 for the output level in microvolts. In the NORM position the output level corresponds to the microvolt dial reading.

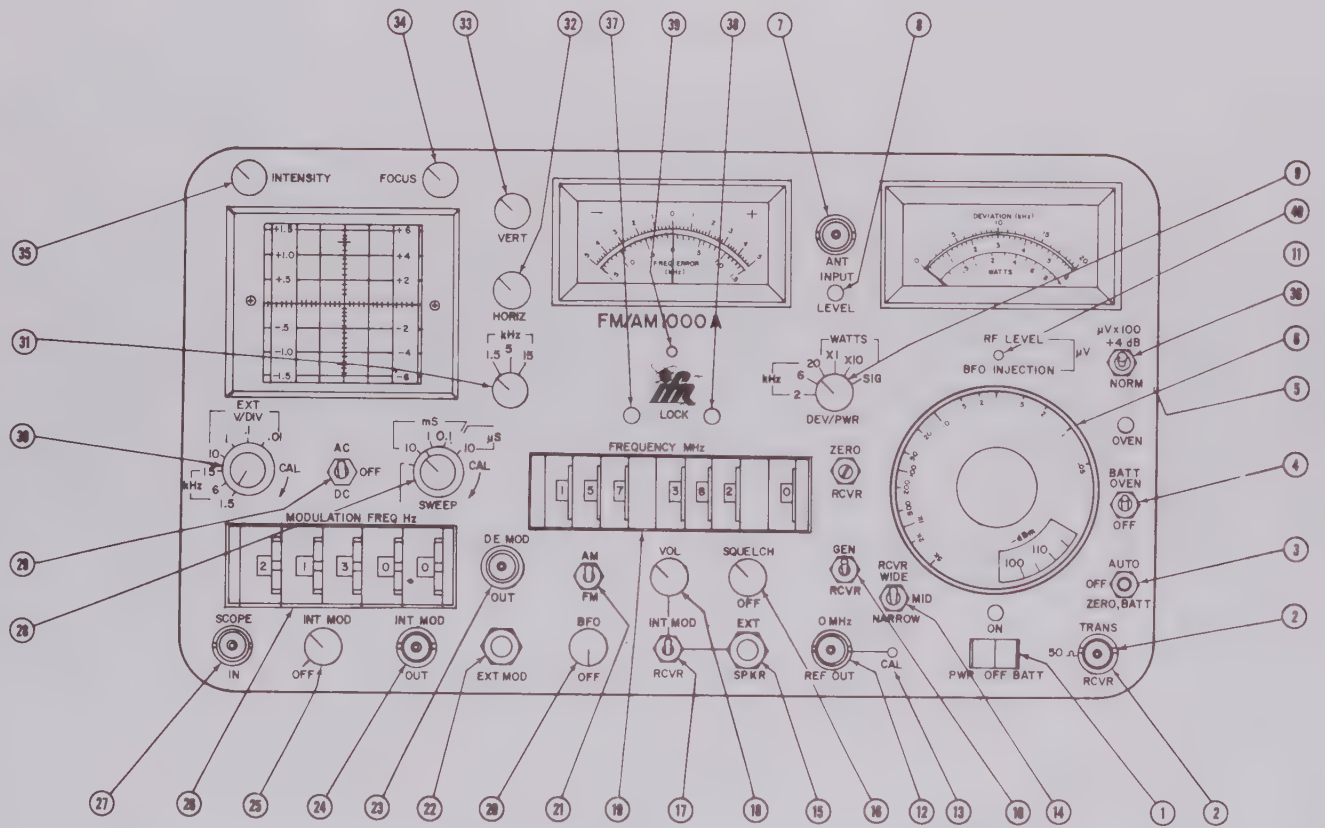
37. High Frequency Phase LOCK Lamp. This lamp to the left of LOCK indicates proper operation of the High Frequency Phase Lock Board and should be lit at all times when the FM/AM-1000A is ON.

38. Low Frequency Phase LOCK Lamp. This lamp to the right of LOCK indicates proper operation of the 79-80 MHz Phase Lock Board and should be lit at all times after the initial five minutes the FM/AM-1000A Power Switch is ON.

39. Frequency Error Meter Mechanical Zero Adjustment. Used in calibration of the Frequency Error Meter.

40. Deviation/Power Meter Mechanical Zero Adjustment. Used in calibration of the Deviation Power Meter.

DATE	REV	CHANGE	APP'D
6-26-78	B	REDRAWN TT	



ITEM	REQ'D	PART NO.	DESCRIPTION
			LIST OF MATERIALS

23-0480	1		
NEXT ASSY	APPLICATION	FROM	MODEL

TOLERANCES
UNLESS OTHERWISE SPECIFIED
SURFACE FINISH
DO NOT SCALE DRAWING

DRAWN Ron Eyrich 6-26-78
CHECKED
APPROVED MO 6/27/78
MATERIAL
FINISH

- IFR INC -
WICHITA, KANSAS

TITLE
IDENTIFICATION OF FRONT PANEL CONTROLS, INDICATORS, and CONNECTORS

SIZE C | PART NUMBER 23-0524 | REV B
SCALE 1=1 | WEIGHT | SHEET 1 OF 1

Figure 1-1

TESTING PROCEDURES

PRELIMINARY:

Connect transceiver under test (T.U.T.) to TRANS/RCVR jack.

Apply power to Test Set. Allow approximately 15 minutes for master crystal oscillator to stabilize (OVEN lamp will dim) for most accurate frequency measurements.

A. TRANSMITTER TESTS:

Set Controls:

RCVR/GEN . . . . . .RCVR

Oscilloscope Power . . . . .dc

Oscilloscope Vertical. . . .1.5, 6, 15 kHz sensitivity

AM/FM. . . . . .As required

SQUELCH/OFF. . . . . .SQUELCH

FREQUENCY MHz. . . . . .As required

I. Carrier Power Output. Place DEV/PWR to X1 to X10 watts range as required. Key transmitter and read carrier power on meter.

II. Carrier Frequency Error. Key transmitter and read carrier frequency error on meter at 1.5, 5, or 15 kHz scale range as required. This measurement can also be performed on a remote station from the ANT jack when the SIGNAL LEVEL lamp is on..

III. AM modulation depth is most easily observed by watching the oscilloscope display of the 250 kHz I.F. pattern, which is automatically fed to the scope with the generator AM/FM switch in the AM position.

NOTE! Amplitude of the 250 kHz I.F. display may be varied only with the scope vernier sensitivity control. This procedure is very convenient for observing speech modulation patterns.

IV. FM Deviation. Connect a microphone to the transmitter's audio input. Place the DEV/PWR to 2, 6, or 20 kHz Deviation position as required. Place WIDE/NARROW to MID or WIDE if measuring deviation above 5 kHz. Key the transmitter and speak into the microphone; or place the INT MOD/RCVR switch to INT MOD, adjust VOL and place the microphone next to the speaker opening.

The INT MOD OUT signal can also be used to modulate the T.U.T. (Note: use a dc blocking capacitor if the audio input is biased for a carbon microphone). Adjust the INT MOD control for the required modulation voltage. The fast attack, slow decay meter and the oscilloscope measure peak deviation. This measurement can also be performed on a remote station from the ANT jack.

V. Sub-Audible Tone Frequency. Place the oscilloscope SWEEP switch to MODULATOR FREQ (fully ccw). Key the transmitter and the sub-audible tone. Adjust the oscilloscope vertical sensitivity vernier control and the INT MOD control until the display has approximately equal vertical and horizontal sizes. Vary the MODULATION FREQ thumbwheel until the Lissajou pattern slows or stops, forming an ellipse. The thumbwheel setting is the sub-audible tone frequency. This measurement can also be performed on a remote station from the ANT.

NOTE: Due to receiver noise, the deviation as indicated by the meter will be higher than the actual value if the input signal strength is less than 40μV (measured at the ANT jack of the FM/AM-1000A). When this is the case, use the oscilloscope to determine the actual tone deviation.

VI. Received Signal Strength of a Remote Station (AM or FM). Connect an external antenna to the ANT jack. Tune in the station to be measured with the FREQUENCY thumbwheel. Place AM/FM to AM, oscilloscope vertical sensitivity to 6 kHz, sweep to 1.0ms/div, and adjust BFO frequency and INJECTION controls until a beat note is heard in the speaker. Adjust the INJECTION control until the peak of the beat between the BFO and the signal to be measured just goes to zero on the oscilloscope I.F. display. The μV reading on the INJECTION control is the station signal strength at the ANT jack.

B. RECEIVER TESTS

Set Controls:

RCVR/GEN. . . . . .GEN

Oscilloscope Power. . . . .dc

Oscilloscope Vertical . . .1.5, 6, 15 kHz as required
Sensitivity

AM/FM . . . . . .As required

FREQUENCY MHz . . . . . .As required

I. 20dB Receiver Quieting. Place INT MOD to OFF. Turn off the FM/AM-1000A and measure the audio output of the T.U.T. with an external ac voltmeter (reference level). Turn on the FM/AM-1000A and adjust the RF LEVEL until voltmeter reading is one-tenth the reference level and read RF LEVEL setting.

II. Carrier Type Squelch Sensitivity. With RF LEVEL at its minimum adjust squelch on T.U.T. until receiver quiets. Increase RF LEVEL until squelch opens and read RF LEVEL setting.

III. Receiver Squelch Point with Sub-Audible Tone.

Set Controls:

RCVR/GEN. . . . .GEN

Adjust INT MOD control for desired FM deviation as indicated by the oscilloscope. Reduce the RF LEVEL until the squelch on the receiver under test closes, and then advance the RF LEVEL to the point where the squelch just opens. Observe the RF LEVEL at this point.

C. SIGNAL GENERATOR CALIBRATION (Frequency).

Set Controls:

RCVR/GEN. . . . .RCVR
AM/FM . . . . . .AM

I. (WWV) Weak. Tune to any WWV frequency (2.5, 5, 10, 15 MHz). If no beat between WWV and the master oscillator (or its sub-harmonics or harmonics) is heard go to step II. If a beat is heard, adjust the 10 MHz - CAL screwdriver pot until the beat frequency is 1 Hz or less. NOTE! A one Hz beat results in a short term accuracy of:

.00004% when beating with WWV at 2.5 MHz
.00002% when beating with WWV at 5.0 MHz
.00001% when beating with WWV at 10.0 MHz

II. (WWV) Strong). Tune in WWV on 10 MHz. Insert a small whip antenna (or wire) in the 10 MHz REF OUT connector. Adjust the whip length (or wire proximity to ANT jack) until a beat is heard and adjust 10 MHz CAL Screwdriver pot for a beat frequency of 1 Hz or less. NOTE! It may be necessary to decrease the amplitude of the input RF signal by using a shorter antenna or a pad in series with the antenna jack. Input signal strength should give a meter indication in the lower quarter of the meter scale. Best adjustment results with the input WWV signal approximately equal to the internal crossfeed signal.

SECTION III

SELF CHECK OF FREQUENCY ERROR INDICATIONS

For all frequency error self checks, the AUTO ZERO/BATT switch must be in the AUTO (up) position.

3.1 Frequency Error Meter Self Checks.

3.1.1 FM/AM-1000A Control Settings:

GEN/RCVR Mode Switch	RCVR
NARROW/MID/WIDE Bandwidth Switch	NARROW
FREQUENCY MHz Thumbwheel	000.0000
AC/DC/OFF Switch	DC
VERT Control	15 kHz
Oscilloscope Vert. Sens. Sw. (Vernier)	CAL

3.1.2 Center the scope trace using the HORIZ and VERT. Controls.

3.1.3 Select 15 kHz on the Frequency Error Range Switch.

3.1.4 Change the setting of the FREQUENCY MHz Thumbwheel to 000.0100.

3.1.5 Verify that both the scope and the Frequency Error Meter read negative 10.0 kHz.

3.1.6 Other scope and meter ranges maybe checked in a similar manner.

3.2 Self Check Deviation/Power Meter.

Checking the Zero of the Meter.

- FM/AM-1000A Control Settings:

GEN/RCVR Mode Switch	RCVR
NARROW/MID/WIDE Bandwidth Switch	NARROW
FREQUENCY MHz Thumbwheel	000.0000
DEV/PWR Meter Function Switch	2.0 kHz

- Deviation/Power Meter should indicate zero.

3.2.2 Deviation/Power Meter Calibration Check.

- FM/AM-1000A Control Settings:

GEN/RCVR Mode Switch	GEN
NARROW/MID/WIDE Bandwidth Switch	MID
FREQUENCY MHZ Thumbwheel	000.0500
DEV/PWR Meter Function Switch	20.0 kHz
INT MOD Control	OFF (full ccw detent)

- Set the MODULATION FREQ Hz Thumbwheel at 1 kHz.
- Adjust the INT MOD Control level to ±10 kHz, observing the scope.
- NOTE: The vernier gain of the Oscilloscope Vertical Sensitivity Switch must be at max. cw.
- Select 20 kHz on the DEV/PWR Meter Function Switch.
- Meter should indicate 10 kHz.
- Move the Oscilloscope Vertical Sensitivity outer knob from 15 to 6 kHz.
- Reduce the INT MOD Control to ±6 kHz, observing the scope.
- Select the 6 kHz setting on the DEV/PWR Meter Function Switch.
- The Deviation/Power Meter should indicate 6 kHz.
- Reduce the INT MOD Control to a presentation of ±2.0 kHz on the scope.
- Set the DEV/PWR Meter Function Switch to 2.0 kHz.
- The Deviation/Power Meter should indicate 2.0 kHz.

3.3 Self Check Output Level.

3.3.1 FM/AM-1000A Control Settings:

GEN/RCVR Mode Switch	GEN
RF Level/BFO Injection/µV Control Dual Range Switch	+40 dB
RF LEVEL/BFO INJECTION/µV Control	1K µV
FREQUENCY MHz Thumbwheel	000.0500
Vertical Sensitivity Switch	.01 V/Div
(Outer Knob)	external on scope
(Vernier)	CAL (max cw)

3.3.2 Connect a short BNC-BNC coax from the TRANS/RCVR Connector to the SCOPE IN Connector.

3.3.3. Scope display should be 0.7 (±0.25) division high.

SECTION IV

THEORY OF OPERATION

4.1 Introduction.

4.1.1 This section contains the circuit theory of operation of the FM/AM-1000A. Included are general description and a main individual circuit description.

4.2 General Description.

4.2.1 The FM/AM-1000A is a digitally synthesized AM, FM, and SSB receiver and low power signal source. The unit is solid state except for the CRT display. It contains a quadruple conversion super heterodyne receiver and a low power signal generator designed to generate communications signals from 1.0 kHz to 999.9999 MHz.

4.3 General Circuit Theory.

4.3.1 The receiver is tuneable from the front panel from 300.0 kHz to 999.9999 MHz in 100 Hz increments. The first I.F. frequency is variable from 1199.0001 MHz to 1200.0000 MHz as the left hand three thumbswitches of the FREQUENCY MHz Thumbwheel are switched from 999 to 000.

4.3.2 The First Local Oscillator operates in 1 MHz increments from 1200 MHz to 2199 MHz as the left three thumbswitches are switched from 000 to 999.

4.3.3 The output of the Second Local Oscillator is variable from 1079.0001 to 1080.0000 MHz as the right hand four digits are thumb-switched from .9999 to .0000. The Second Local Oscillator (Approx-imately 1080 MHz) beats with the first I.F. (Approximately 1200 MHz) to produce the second I.F. of 120 MHz.

4.3.4 A beat frequency oscillator injection signal is injected into the "Second Mixer Diode Switch" for received signal level mea-surements and receiving of SSB and CW signals. A 10 MHz crystal is pulled approximately ±208 Hz from 10 MHz, and is multiplied by six and by two to produce 120 MHz ±2.5 kHz. This circuitry is in the GEN module. The injection level is selected by the front panel RF LEVEL/BFO INJECTION /µV Control.

4.3.5 The Third Local Oscillator is a crystal oscillator to 109.3 MHz which beats with the 120 MHz I.F. to produce the third I.F. of 10.7 MHz.

4.3.6 The Fourth Local Oscillator is a crystal oscillator that produces a 10.950 MHz signal which beats with the 10.7 MHz I.F. to produce a Fourth I.F. of 250 kHz.

4.3.7 The 250 kHz I.F output is demodulated for FM by a pulse counter operating at 250 kHz or diode detected for AM output.

4.4 Frequency Control System for the First Local Oscillator (1200-2199 MHz).

4.4.1 Control for the First Local Oscillator starts with a 10 MHz signal from the oven stabilized Master Oscillator operating at 10 MHz ±.00005%. This 10 MHz signal is multiplied ten times in the 100 MHz Multiplier and 108 MHz Mixer Module (see block diagram Fig. 6-30). The 100 MHz signal is fed through a filter amplifier and then into a 100 MHz amplifier which drives a snap diode. Harmonics of the snap diode are selected by five tuned filters: 1100 MHz, 1300 MHz, 1500 MHz, 1700 MHz, and 1900 MHz. Diode switches select which filter output drives the single diode mixer. The mixer is also driven with a signal from the First Local Oscillator (1200-2199 MHz). When the Local Oscillator is operating from 1200-1399 MHz, the output of the 1100 MHz filter is selected to mix with the Local Oscillator. The mixer produces an output of 100-299 MHz. As the First Local Oscillator is operating from 1400-1599 MHz, the 1300 MHz filter is selected. There are five bands in which the First Local Oscillator operates in this manner. In each of these bands, the mixer output is always 100-299 MHz. This 100-299 MHz signal is divided by two in the Heterodyne amplifier and Divide by Two Prescaler. The prescaler output (50-149.5 MHz) feeds the program divider and phase lock loop which controls the First Local Oscillator frequency. The left hand three digits of the front panel thumbswitches control this program divider.

4.5 Frequency Control System for Second Local Oscillator (1079.0001-1080.0000 MHz).

4.5.1 10 MHz from the oven stabilized Master Oscillator is multiplied to 100 MHz in the 100 MHz Multiplier and 108 MHz Mixer Module. A front panel controlled phase locked loop, operating from 79.0001-80.0000 MHz and then divided by 10, is mixed with 100 MHz in the 100 MHz Multiplier and 108 MHz Mixer Module to produce 107.90001-108.0000 MHz. This signal is filtered further by a passive 108 MHz filter and fed on to the 1080 MHz Multiplier Amp Module, which multiplies this signal ten times to produce 1079.0001-1080.0000 MHz at a typical level of +5 dBm.

4.6 Audio Modulation Generator (5 Hz to 9999.9 Hz).

4.6.1 A heterodyne system produces the audio tone output by mixing a 20 kHz reference signal with approximately 20-30 kHz. The result is approximately a 5 Hz-10 kHz output after passing through a low pass filter. A 2-3 MHz, (actually 2.0005-2.9999 MHz), oscillator output frequency is divided by one hundred to derive the 20-30 kHz signal. A phase locked loop controlled by the MODULATION FREQ Hz Switch controls this 2-3 MHz oscillator. A selected audio modulation frequency of 0000.0 Hz produces 2.0000 MHz and a selected audio frequency of 9999.9 Hz produces 2.9999 MHz.

4.7 Clock Divider Circuit.

4.7.1 10 MHz from the oven stabilized Master Oscillator is divided to lower frequencies by TTL dividers to be used for the following reference frequencies:

1. 20 kHz - Audio Modulation Generator
2. 10 kHz - 120 MHz FM/AM Generator Module
3. 100 Hz - Low Frequency Phase Lock Loop
   (79.0001-80.0000 MHz ÷ 10 = 7.90001-8.00000)
4. 10 Hz - Audio Modulation Generator

4.8 Oscilloscope.

4.8.1 The horizontal deflection plates of the CRT are controlled by a differential amplifier consisting of Q3414, Q3415, and Q3416. Q3415 provides a constant current source to the differential pair consisting of Q3414 and Q3416, which drives the left and right-hand deflection plates, respectively. A reference voltage from the HORIZ Control is applied to Q3416. Q3414 is driven by either the scope's internal Horizontal Sweep Generator or by the Audio Modulation Generator as selected by the SWEEP Control.

4.8.1.2 The sweep generator is a sawtooth generator consisting of a constant current source, a flip-flop, a buffer amplifier, a trigger, a clamp, and a horizontal retrace blanker. The flip-flop, consisting of Q3408 and Q3409, starts out with Q3408 in the "off" state and Q3409 in the "on" state. A Ground Path is provided for one of four timing capacitors by the front panel SWEEP Control. This capacitor is charged through the constant current source (Q3412) and as it charges, the base voltage of the buffer amplifier (Q3413) becomes more positive, allowing the emitter to become more positive. This turns the left-hand leg of the differential driver (Q3414) on in a linear fashion, causing the beam to sweep across the tube. At the same time, the emitter of the trigger (Q3407) is going positive to a level set by the voltage on the base through the trigger amp (X3402). When the timing capacitor charges to the trigger voltage Q3407 conducts. This supplies a trigger voltage to a flip-flop consisting of Q3408 and Q3409. This turns on Q3408, which in turn turns Q3409 off. The collector of Q3409 drives the clamp and the blanker. When Q3409 turns off, the blanker (Q3410) and clamp (Q3411) turn on. The clamp provides a ground path to discharge the timing capacitor. As the timing capacitor discharges to near zero volts, CR3405 turns off Q3408 which resets the flip-flop. Resetting the flip-flop turns off the clamp and blanking transistors and allows the timing capacitor to start charging.

4.8.2 Vertical Deflection Circuit and Vertical Pre-Amplifier.

4.8.2.1 The vertical deflection plates of the CRT are controlled by a differential amplifier consisting of Q3404, Q3405, and Q3406. Q3404 and Q3405 are the differential amplifier and Q3406 is a constant current source. Q3405 drives the bottom deflection plate and is the reference. Vertical centering is accomplished by a front panel control, VERT Control, which adjusts the reference voltage input to Q3405, the reference leg of the differential amplifier. Q3404 receives its signal from the vertical amplifier. When the inputs to Q3404 and Q3405 are at equal levels, the beam on the CRT will be centered.

4.8.2.2 The vertical amplifier is an operational amplifier (X3403) fed by a differential FET Amplifier (Q3402) to provide a high impedance input.

4.8.2.3 X3401 and Q3401 are a +11 V Regulator for the oscilloscope functions. CR3418 and CR3419 provide high voltage protection to the FET input.

4.9 Power Supply

4.9.1 Rear Panel (Fig. 6-4)

4.9.1.1 In the AC Mode of operation T18001 provides taps for 110 or 220 V ac and drops it down to approximately 15.0 V ac. It is then rectified by CR18001 and filtered by C18001 to provide 18.0 V dc at 4.5 Amps. This 18 V supply feeds the oscillator oven and the duty cycle regulator when the front panel Power Switch is in the PWR position.

4.9.1.2 External dc from 12-23 V dc can also be fed to the same point that the ac power supply feeds.

4.9.1.3 The battery can also be charged directly from an external source through CR18001 which prevents discharge of the battery through the external source.

4.9.2 Duty Cycle Regulator and Battery Charger (Fig. 6-11).

4.9.2.1 The battery charger circuit is a current regulator consisting of X5102, Q5110 and Q5111. The op-amp (X5102) senses battery voltage and provides a control voltage through Q5111 to Q5110. Q5111 provides a low impedance output to the op-amp. Q5110 is a series regulator controlling the current from the raw dc out of the power supply to the battery.

4.9.2.2 The Duty Cycle Regulator's driving oscillator is a 20 kHz multivibrator which has a square wave output that is changed into a modified sawtooth by C5113 and Q5105. Q5105 is a constant current source. The modified sawtooth is fed into the inverting input of the op-amp X5101. The noninverting input of X5101 sets the level at which X5101 switches. The output is a square wave with a duty cycle responsive to the dc voltage on the noninverting input of X5101. Q5101 provides a constant current source and CR5109 is a 6.2V regulator used for the multivibrator and for a reference transistor (Q5109). If the 12V secondary of the transformer is too high the collector of Q5109 goes higher increasing the reference voltage on the noninverting input on the op-amp. This sets the cutoff higher up the ramp shortening the duty cycle which shortens the charging time on the primary of T5101 which will lower the output voltage on the secondary and maintain 12V dc. If the 12V output is loaded so that the voltage is low, the reference will go low which will lower the switching point on the ramp lengthening the pulse which will increase charging on the transformer which will increase the current capacity of the secondary increasing the secondary to 12V. The drive circuit consists of Q5106, Q5107, Q5108, Q5102 and Q5112. Q5106 is a buffer driver which supplies the current necessary to switch on the parallel drivers. This current goes through a two turn winding so that the bases of the outputs can go below ground in order to turn on the power taansistors fully. R5115 adjusts the base level of Q5109 which sets the +12V output.

4.10 Operation as a Signal Generator (Fig. 6-16 and 6-59)

4.10.1 As a signal generator, the signal originates in the 10 MHz oven stabilized master oscillator and is divided down to 10 kHz in the "Clock Divider" module, then fed as a reference signal to the "120 MHz FM/AM Generator" module. In the "120 MHz FM/AM Generator" module, 120 MHz is produced by mixing a 54.78 MHz crystal oscillator with a 5.22 MHz FM oscillator to produce 60 MHz, then multiplying by two. FM modulation of ± 7.5 kHz is imposed on the 5.22 MHz VCO which then becomes ± 15 kHz at the 120 MHz output stage because of the frequency doubling stage. The 60 MHz signal is phase locked to the incoming 10 kHz reference from the clock divider.

4.10.2 Refer to figure 6-16. The Second Mixer is fed in reverse by the 120 MHz FM/AM Generator's output after being attenuated by the front panel RF Level Control. The 1199.0001-1200.0000 MHz I.F. system is also reversed by a diode switch so that the First Mixer is now a signal Generator from 100 Hz to 999.9999 MHz. This signal passes through the transfer relay, now in the generator mode, and passes through a 20 dB pad, and then to the front panel "TRANS/RCVR" jack. The level at this jack is from -33 dBm to -133 dBm into a 50 ohm load.

SECTION V

PERFORMANCE EVALUATION

5.1 Introduction.

5.1.1 This section contains procedures to verify the proper performance of the FM/AM-1000A. If the unit fails to meet the performance as outlined in this section refer to the appropriate calibration section of this manual.

5.1.2 This instrument has been tested and calibrated at the factory prior to shipping and should only require periodic inspection and calibration. DO NOT attempt any adjustment except as specified in the calibration section of this manual and then only with a thorough understanding of the theory of operation.

5.1.3 Case Disassembly. (Not required for general evaluation).

5.1.3.1 Remove the four Phillips screws that hold the support bars to the legs and remove the bars. Remove the eight Phillips screws around the outside perimeter of the rear of the case. Remove the top Phillips screw at the front center top of the case. Remove the Phillips screw at the front center bottom of the case. Set the unit on its legs and slide the case back. Lift the unit out of the case.

5.2 Signal Generator Calibration (Frequency).

5.2.1 Before applying power, ensure that both panel meters are mechanically zeroed. Set the RCVR/GEN switch to RCVR, and the AM/FM switch to AM. Connect external antenna to antenna input connector. Ensure that AUTO ZERO/BATT switch is in AUTO position.

5.2.2 Tune to any WWV frequency +1 kHz (2.5, 5, 10, or 15 MHz). If no beat between WWV and the Master Oscillator is heard because of strong WWV signal, go on to paragraph 5.2.3. If a beat is heard, adjust the 10 MHz-CAL screwdriver pot on front panel until the beat frequency is 1 Hz or less.

NOTE

A one Hz beat results in a short term accuracy of .0004% when beating with WWV at 2.5 MHz, .00002% when beating with WWV at 5.0 MHz, .00001% when beating with WWV at 10 MHz.

5.2.3 Tune in WWV on 10 MHz +1 kHz. Insert a small whip antenna (or wire) in the 10 MHz REF OUT Connector. Adjust the wire length (or whip proximity to antenna jack) until a beat is heard and adjust the 10 MHz CAL screwdriver pot for a beat frequency of 1 MHz or less.

NOTE

When not using the procedure in 5.2.3, it may be necessary to decrease the input of the RF signal when WWV is strong by using a shorter antenna or pad in series with the antenna jack. The input signal strength should give a meter indication in the lower quarter of the meter scale. Best adjustments result with the input WWV signal approximately equal to the internal crossfeed signal.

5.3 Self Check of Frequency Error Meter.

5.3.1 Set RCVR/GEN switch to RCVR position, set FM/AM switch in FM, set bandwidth switch in narrow band position and select 000.0000 frequency. Position AUTO ZERO/BATT switch to AUTO for remainder of the Evaluation Procedure. Center the scope trace, zero the frequency error meter, and select 15 kHz range. Select 000.0100 MHz and verify the frequency error meter indicates a negative 10.0 kHz (± 10%). The scope should indicate negative 10 kHz (± 5%). Select 1.5 kHz scale on Frequency Error Meter range selector switch. Select GEN position and re-zero Frequency Error Meter using front panel ZERO RCVR screwdriver control if necessary. Other scope and meter ranges can be checked in a similar manner.

NOTE

FREQ ERROR meter may be positioned off zero when the squelch isn't opened. This offset does not represent an error or malfunction. FREQ ERROR meter zeroing should be evaluated in the generate function.

5.4 Self check of Deviation Meter. Use actual scope reading obtained in 5.3.1 as reference for deviation meter checks. By doing this the Deviation Meter is referenced directly to the frequency synthesizer.

5.4.1 Select the RCVR position of the RCVR/GEN switch. Select narrow band operation with the bandwidth switch. Select 000.0000 MHz. Select the 2.0 position on the deviation meter switch. The deviation meter should indicate zero (± 100 Hz).

5.4.1.1 Switch to GEN Mode, set bandwidth switch to mid, turn Internal Modulation off, select 2 kHz scale on deviation meter and observe that meter indicates zero (± 50 Hz), and select 20 kHz on deviation meter. Select 1 kHz on Internal Modulation frequency

select thumbswitches and adjust INT MOD level for a scope indication of "+" and "-" 10 kHz. The DEV meter should indicate 10 kHz (±7%). Reduce INT MOD for a scope indication of "+" and "-" 5 kHz. Select 6 kHz scale on the DEV meter. The deviation meter should indicate 5 kHz (± 7%). Reduce INT MOD for a scope indication of "+" and "-" 2 kHz. The deviation meter should indicate 2.0 kHz (± 10%).

5.5 Self Check of Output Level.

5.5.1 Select GEN Mode, adjust output attenuator for 1K µV, select 000.0500 MHz on the frequency MHz thumbswitches. Select External Input at .01V/DIV on scope and ensure that the vertical vernier is in CAL position. Connect a short BNC to BNC coax from RF output to scope input. The scope display should be 0.7 divisions high (± 0.25 divisions).

5.6 Check of RF Power Meter.

5.6.1 Using short lengths of coaxial cable connect a 5-10 watt VHF transmitter with a 150 MHz range to the input of an in-line RF power meter with a verified accuracy of ± 5%. Connect the output of the RF power meter to the TRANS/RCVR input of the unit. Select X1 watts on "DEV/PWR" switch. Key transmitter and read power output on the in-line watt meter. Check that FM/AM-1000A indicates the same, ±10%.

5.6.2 Perform the same test on the X10 watts range with a 50-90 watt transmitter.

5.7 Check for holes in Synthesizer Operation.

5.7.1 Set frequency select MHz thumbswitches to 000.0000 MHz. Set RCVR/GEN switch on RCVR position, set FM/AM switch in FM position, and set bandwidth switch in NARROW position. Select the 1.5 kHz range on the kHz frequency error range switch. Center the scope trace and select the 1.5 kHz range. Step the 100 Hz frequency select switch through its range and check that the frequency error meter steps in approximately 100 Hz negative steps for each increment. Select the 15 kHz range on the scope and on the frequency error meter. Step the 1 kHz frequency select thumbswitch through its range and check that the FREQ ERROR meter and the scope indications move negative in approximately 1 kHz increments for each step. On the 15 kHz range, turn the scope vernier full counterclockwise and center trace, bandwidth on wide, and step the 10 kHz thumbswitch through its range and check that the scope trace moves in equal negative increments of the thumbswitch.

5.7.2 Switch to GEN mode. Using a short length of coax connect scope input to TRANS/RCVR output. Set attenuator at maximum. Select 0.1V/DIV on vertical (ensure vernier is in CAL position). Select 10us/DIV horizontal. Step 100 kHz thumbswitch through its range and assure sinewave display changes 100 kHz each step.

5.7.3 If an external scope is available with a bandwidth of 50 MHz or greater, connect TRANS/RCVR output to vertical input of the scope. Use most sensitive range and adjust output attenuator for a usable amplitude. Select a sweep that produces a usable sine display, step the 1 MHz thumbswitch through its range and assure that the scope display changes each step. Depending on the bandwidth of the scope used, you may use this set up to check the 10 MHz decade in a similar manner.

NOTE

It may be necessary to put a BNC Tee connector on the input of the scope and terminate the open end of the Tee into a 50 ohm load in order to get a constant output from the generator.

5.8 Tone Generator Performance.

5.8.1 Using a short length of coax connect INT MOD OUT to SCOPE IN. Set Ext V/DIV to 1. Set SWEEP to 10ms. Set AC/OFF/DC switch to DC. Set MODULATION FREQ Hz switch to 1000.0 Hz. Set INT MOD control to give a scope indication of "+" and "-" 1.5V. Select 0010.0 on MODULATION FREQ Hz switch and adjust SWEEP vernier for a single sine wave on the scope. Select 0011.0 Hz through 0019.0 Hz on MODULATION FREQ Hz thumbswitches and observe that the frequency increases for each increment. Return MODULATION FREQ Hz thumbswitches to 0010.0 Hz. Step the 10 Hz thumbswitches through its range. The scope will indicate a new sine wave for each increment up to 0090.0. Select 0100 Hz, set the SWEEP to the 1ms range, and adjust the SWEEP vernier for a single sine wave as above. Step through the 100 Hz range. Each increment will add an additional sine wave up to 0900.0. Select 1000.0 Hz. Set SWEEP to .1ms range. Adjust vernier to display a single sine wave. Step through the 1 kHz range. Each increment will add an additional sine wave. The amplitude will vary through the range of the oscillator.

5.9 Power Supply Evaluation. (Remove case)

5.9.1 Back Panel. (Fig. 6-5)

A. With the set operating on line voltage, measure the +12 volt supply at pin E of the Regulator and Power Supply Board Connector J-17 (See Fig. 6-1-2 and 6-7 for connector pin layout) or at the red wire connection on J-3, located just to the right of J-17 (Fig. 6-1-2). The voltage should be +12.2 volts (typically +12.1 to +12.3 volts).

B. Measure the +5 supply at the orange wire connection on J-3. The voltage should be between +4.7 to +5.25 volts.

C. Measure the -39 volt supply with scope on and off at J-17 pin 7. The voltage should be between -37 to -45 volts while operating on line voltage or on battery power.

D. Using a scope, check the 20 kHz ripple on all dc supplies. Maximum allowable ripple voltage is 75mV P-P.

E. Disconnect rear panel battery and disconnect line cord. Connect external power supply to "+" terminal of battery connector and "-" side to test set chassis and set external power supply to 14 volts (± 0.3V). Press BATT TEST switch on front panel. Check panel meter for identical voltage (± 0.3V).

F. Turn on battery timer by momentarily depressing the POWER SWITCH to the BATT side. Battery timer "turn-on" should be indicated by test set operation. Slowly reduce external power supply voltage from 14 volts to approximately 11 volts. Battery timer and relay should shut off at external voltage of 11.15 volts to 10.8 volts. For this test, the external power supply must be capable of supplying 10 amps with a maximum ripple voltage of 0.2 volts P-P. Output impedance of the power supply should be quite low to prevent external power supply voltage instability as the input voltage is reduced and the test set duty cycle regulator compensates. For example, when the test set's input voltage decreases, the duty cycle regulator will increase the current drain from the external power supply to maintain constant power consumption. This will cause some external power supplies to become unstable. The start-up surge current of the duty cycle regulator is quite high and may cause some external power supply's current limiting to shut down.

G. Increase external power supply voltage to 14 volts. Turn on the BATT OVEN switch. Observe that the oven light comes on. Slowly reduce external power supply voltage toward 11 volts. Oven light should go out between 11.15 and 10.8 volts.

5.9.2 Power Supply and Regulator Board.

A. With the set operating on line voltage, measure the +11 volts supply at pin 5 of J-27, the Regulator and Power Supply Board Connector (see Fig. 6-1-2) (see Fig. 6-7 for connector pin layout). Voltage should be between 10.93 and 11.07 volts.

B. Measure -35 volt supply at the Regulator and Power Supply connector pin 11 (J-17). Voltage should between -34.5V and -35.5V.

C. Measure -12 volts supply at the Regulator and Power Supply Board connector pin 15 (J-17). Voltage should be between -10.5 and -13 volts.

SECTION VI

CALIBRATION

6.1 Introduction.

6.1.1 The purpose of this section is to give the technician a guide for correcting calibration errors discovered during performance checks (Section 5) of the FM/AM-1000A. A quality spectrum analyzer covering 10 MHz to 2.2 gHz, a well calibrated signal generator, and a 40 MHz oscilloscope are required for complete calibration and service of the FM/AM-1000A. Therefore, this section will be directed toward those portions of the unit that can be calibrated with the average communications shop's equipment.

6.2 Oscilloscope Calibration.

6.2.1 With power off, assure that both meters are mechanically zeroed. Select 000.0000 on FREQUENCY MHz thumbswitches. Select Receive. Select narrow band. Unless stated otherwise, set AUTO ZERO/BATT switch to AUTO for the entire calibration procedure. Zero Frequency Error meter with front panel screwdriver adjustment. Select 15 kHz range on scope Vertical Sensitivity switch. Select scope power to dc position. Center scope trace vertically. Select 000.0100 on FREQUENCY MHz thumbswitches. Scope should show "-" 10 kHz (± 0.5 kHz). If not adjust SCOPE DEVIATION pot (R44) (Fig. 6-76) for "-" 10 kHz indication on scope.

6.3 Receiver Narrow band/Wide band gain adjustment.

6.3.1 With no antenna connected, select AM. Select 155.5000 on FREQUENCY MHz thumbswitches. Select Narrow band. Select Receive. Adjust NARROW BAND ADJUST gain pot (R-8) (Fig. 6-76) upward until Signal Strength meter just moves. Note the RF noise level on the scope. Decrease NARROW BAND ADJUST gain pot (R-8) until RF noise level is reduced by 50%.

6.3.2 With no antenna connected, select AM. Select 155.5000 on FREQUENCY MHz thumbswitches. Select Wide band. Select Receive. Adjust WIDE BAND ADJUST gain pot (R-7) (Fig. 6-76) upward until Signal Strength meter just moves. Note the RF noise level on the scope. Decrease WIDE BAND ADJUST gain pot (R-7) until RF noise level is reduced by 50%.

6.4.3 AGC Adjustment. Select Narrow band. Select Receive. Select 155.5000 on FREQUENCY MHz thumbswitches. Assure that BFO is off. Select AM. Inject a signal of -6 dBm to the antenna input jack. Adjust AGC adjustment pot (R-80) (Fig. 6-76) until the RF level on the scope increases beyond AGC control. Adjust AGC adjustment pot (R-80) back to the point where AGC gains control of scope RF indication. (This is the point at which further downward adjustment of R-80 has no effect). Reduce input signal level to -25 dBm. If signal strength meter indication is above full scale, adjust R-80

to reduce meter indication to full scale. If meter indication is less than full scale, do not change R-80.

6.4 Frequency Error Meter zeroing Adjustment (Setting automatic zeroing circuit to proper operating range).

6.4.1 Assure that both meters are mechanically zeroed with power off. Select Generate. Select Narrow band. Select 1.5 kHz range on Frequency Error meter range select switch. Adjust front panel zero adjustment (screwdriver adjustment) to zero Frequency Error meter. (Range of adjustment is approximately ± 600 Hz). If Frequency Error meter cannot be zeroed with front panel control because it is not out of range, return front panel zero adjustment control to Mid position. Monitor Test Point (TP) (Fig. 6-76) on 250 kHz IF Monitor and Audio Board with voltmeter or oscilloscope and observe voltage to be +1 volt (± 0.5V). If not, adjust FREQUENCY ERROR ZERO pot (R-27) slowly clockwise to increase voltage or counter-clockwise to decrease voltage. While adjusting R-27 for automatic zeroing pulse (every 1.5 seconds) until voltage indication is steady at +1V (± 0.5V). The automatic zeroing range voltage indication at the Test Point (TP, Fig. 6-76) is +6 volts to -7 volts. Outside of this range, automatic zeroing is inoperative. Select Wide band. Voltage at Test Point should be between +1 and -2.5 volts. (Typically, from +1 volt to -1 volt when switching from Narrow band to Wide band). The front panel Frequency Error meter should then be zeroed with front panel zero adjustment control. Switch to RCVR, turn SQUELCH full clockwise, and adjust R-109 to zero Frequency Error meter indication.

6.5 Frequency Error Meter Calibration.

6.5.1 1.5 kHz Adjustment. Select Receive. Select 000.0000 on FREQUENCY MHz thumbswitches. Zero Frequency Error meter using front panel screwdriver zeroing adjustment control. Select 1.5 kHz on Frequency Error Range switch. Select 000.0010 on FREQUENCY MHz thumbswitches. Frequency Error meter should indicate "-" 1 kHz (± 10%). If not, adjust 1.5 kHz FREQUENCY ERROR pot (R-42) (Fig. 6-76 for a "-" 1 kHz (± 10%) meter indication.

6.5.2 5 kHz Adjustment. Select 5 kHz on Frequency Error Range Switch. Select 000.0050 on FREQUENCY MHz thumbswitches. Frequency Error meter should indicate "-" 5 kHz. (± 10%). If not, adjust 5 kHz FREQUENCY ERROR pot (R-41) (Fig. 6-76) for a "-" 5 kHz (± 10%) meter indication.

6.5.3 15 kHz Adjustment. Select 15 kHz on Frequency Error Range Switch. Select 000.0100 on FREQUENCY MHz thumbswitches. Frequency Error meter should indicate "-" 10 kHz (± 10%). If not, adjust 15 kHz FREQUENCY ERROR pot (R-39) (Fig. 6-76) for a "-" 10 kHz (± 10%) meter indication. Select Generate. Select 1.5 kHz scale on Frequency Error Meter range select switch. Touch up meter zero with front panel screwdriver zero adjustment if necessary.

6.6. Frequency Deviation Meter Calibration. (Oscilloscope calibration must be completed prior to meter calibration).

6.6.1 Select Receive. Select Narrow band. Select 000.0000 on FREQUENCY MHz thumbswitches. Select 2 kHz on DEV/PWR Meter Function switch. Adjust RECEIVER DEVIATION ZERO pot (R-52) (Fig. 6-76) for zero Frequency Deviation meter indication. Select Generate. Select Mid band. Turn Tone generator off by rotating INT MOD Control fully counterclockwise. Ensure that 2 kHz is selected on DEV/PWR Meter Function Switch. Adjust GENERATOR DEVIATION ZERO pot (R-70) (Fig. 6-76) for zero Frequency Deviation meter indication (± ½ needle width). Select 15 kHz on scope Vertical Sensitivity Switch. Center scope trace. Select 20 kHz on DEV/PWR Meter Function switch. Select 1000.0 Hz on MODULATION FREQ Hz thumbswitches and set level with INT MOD control until scope shows + and - 10 kHz. Adjust 20 kHz DEVIATION ADJUST pot (R-68) (Fig. 6-76) until Frequency Deviation meter indicates 10 kHz (± 0.1 kHz). Select 6 kHz on scope Vertical Sensitivity switch. Reduce the 1000.0 Hz on scope to + and - 6 kHz deviation with INT MOD control. Select 6 kHz range on DEV/PWR Meter Function Switch. Adjust 6 kHz DEVIATION ADJUST pot (R-66) (Fig. 6-76) until Frequency Deviation meter indicates 6 kHz (± 0.1 kHz). Reduce 1000.0 Hz level on scope to + and - 2 kHz. Select 2 kHz on DEV/PWR Meter Function switch. Adjust 2 kHz DEVIATION ADJUST pot (R-64) (Fig. 6-76) until Frequency Deviation meter indicates 2 kHz (± 0.05 kHz).

6.6.2 If there are problems in obtaining desired results, contact IFR Customer Service Department.

6.7 RF Power Meter Calibration

6.7.1 0-10W Adjustment. Refer to Figure 6-9. Select 0-10W (X1) range on DEV/PWR Meter Function Switch. Adjust ZERO POWER ADJUSTMENT pot (R-4241) (Fig. 6-9) to zero the RF POWER METER indication. Using short lengths of coax cable, connect a 5 to 10 watt VHF transmitter to the input of an inline wattmeter with a known accuracy of 5%. Connect the output of the wattmeter to the TRANS/RCVR input of the FM/AM-1000A. Select Receive mode of operation. Key the transmitter and observe the forward power on the inline wattmeter. Adjust the 0-10W ADJUSTMENT pot on the Power Supply Regulator board (R-4244) (Fig. 6-9) until the front panel RF POWER METER indication agrees with the inline wattmeter.

6.7.2 0-100W Adjustment. Refer to Figure 6-9. Select 0-100W (X10) range on DEV/PWR Meter Function switch. Assure that RF POWER METER indication is zero. If not, adjust ZERO POWER ADJUSTMENT pot (R-4241) (Fig. 6-9) to zero the RF POWER METER indication. Using short lengths of coax cable connect a 50 to 60 watt VHF transmitter to the input of an inline wattmeter with a known accuracy 5%. Connect the output of the wattmeter to the TRANS/RCVR input of the FM/AM-1000A. Select Receive mode of operation. Key the transmitter and observe the forward power on the inline wattmeter. Adjust the 0-100W ADJUSTMENT pot (R-4242) on the Power Supply Regulator board (Fig. 6-9) until the front panel RF POWER METER indication agrees with the inline wattmeter.

6.7.3 If adjustment using normal shop equipment is not possible, contact IFR Customer Service Department.

6.8 Power Supply Calibration FM/AM-1000A. (Re: Power Supply Evaluation, Section 5).

6.8.1 Remove ac line cord and pull battery (or regulator) fuse to prevent damage from accidental shorts while removing duty cycle regulator cover. Remove back cover from Duty Cycle Regulator mounted on speaker side of back panel by removing four screws. The Duty Cycle Regulator board is attached to the cover.

A. Prior to the applying power, insert battery (or regulator) fuse, With the set operating on line voltage, measure the +12 voltage at pin E of the Regulator and Power Supply Board Connector, J-17 (Fig. 6-1-2) (see Figure 6-7 for connector pin layout). Voltage should be +12.2 volts (typically +12.1 to +12.3 volts). Adjust R-5115, the 1K pot, on the Duty Cycle Regulator board for +12.2 volts (Fig. 6-12).

B. +5 volt supply value is set by +12V adjustment and should be +4.7 to +5.25 volts on orange wires on J-3, located just to the right of J-17 (Fig. 6-1-2).

C. -39 volt supply value is set by +12V adjustment and should be between -37 to -45 volts at J17 pin 7 with scope on and off while operating on line or battery.

D. If more than a 75mV ripple is present on dc supply voltages, trouble in the filters is indicated.

E. Disconnect rear panel battery and disconnect line cord. Connect external power supply to "+" terminal of battery connector and "-" side to test set chassis and set external power supply to +14 volts (± 0.3V). Press BATT TEST switch on front panel. Panel meter should indicate 14V (± 0.3V). If not, adjust BATTERY METER ADJUSTMENT pot (R-4227) (Fig. 6-9) until panel meter indicates +14 volts (± 0.3 V).

F. Turn on battery timer by momentarily depressing the POWER SWITCH to the BATT side. Battery timer "turn-on" should be indicated by test set operation. Slowly reduce external power supply voltage from 14 volts to approximately 11 volts. Battery timer and relay should shut off at external voltage of 11.15 volts to 10.8 volts. If not, adjust LOW VOLTAGE CUTOFF pot (R-4214) (Fig. 6-9) so that battery timer and relay shut off between 11.15 and 10.8 volts. For this test, the external power supply must be capable of supplying 10 amps with a maximum ripple voltage of 0.2 volts P-P. Output impedance of the power supply should be quite low to prevent external power supply voltage instability as the input voltage is reduced and the test set's duty cycle regulator compensates. For example, when the test set's input voltage decreases, the duty cycle regulator will increase the current drain from the external power supply to maintain constant power consumpation. This will cause some external power

supplies to become unstable. The start-up surge current of the duty cycle regulator is quite high and may cause some external power supply's current limiting to shut down.

G. Increase external power supply voltage to 14 volts. Turn on the BATT OVEN switch. Observe that oven light comes on. Slowly reduce external power supply voltage toward 11 volts. Oven light should go out between 11.15 and 10.8 volts. If not, adjust OVEN LOW VOLTAGE CUTOFF pot (R-4233) (Fig. 6-9) so that oven light goes out between 11.15 and 10.8 volts. Disconnect external power supply install duty cycle regulator and cover, install battery (or regulator) fuse, install battery and cover, and reconnect ac line cord.

6.8.2 Power Supply and Regulator Board

A. With the set operating on line voltage, measure the +11 volt supply at pin 5 of J17, the Regulator and Power Supply Board connector (see Fig. 6-1-2) (see Fig. 6-7 for connector pin layout). Voltage should be between 10.93 to 11.07 volts. If not, adjust 11V ADJUSTMENT (R-4224) (Fig. 6-9) for +11 volts (± 0.07V).

B. Measure -35 volt supply at the Regulator and Power Supply Board connector pin 11 (J-17). Voltage should be between -34.5V and -35.5V.

C. Measure -12 volt supply at the Regulator and Power Supply Board connector pin 15 (J-17). Voltage should be between -10.5V and -13V.

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7.2 Front Panel Assy 1-23-0578

Dwg. 4-23-0474 Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
		1-23-0578	Front Panel Assy.	REF.
		3-23-0005-1	. Front Panel Structure	1
		1-23-0344	. Mounting Structure	1
		1-23-0258	. Frame Support Members	6
		3-23-0589	. Front Panel Overlay	1
I1-15	BEP		. Lamp Base, Shelly	5
I1-I5	901-531		. Lamp, Ericson Centron	5
I1	GBP		. Lens, Green Shelly (ANTENNA INPUT LEVEL)	1
I4	ABP		. Lens, Amber Shelly (BATT OVEN)	1
I2, I3, I5	RBP		. Lens, Red Shelly (Ø LOCK & PWR ON)	3
J-104	12A		. Jack, ¼" phone Switchcraft (EXT. SPKR)	1
J-106	12B		. Jack, ¼" phone Switchcraft (EXT MOD)	1
J-107	UG1094/U		. Connector, BNC Amphenol (INT, MOD)	1
J-105	UG1094/U		. Connector, BNC Amphenol (DEMOD)	1
R-1	RVGLAYSA254A		. Potentiometer, Clarostat (ZERO RCVR)	1
R-2	CM40780	1-76-0168	. Potentiometer, Clarostat (10 MHz CAL)	1

Dwg. 4-23-0474 Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
R-3	382-N-10K-Z	1-76-0178	. Potentiometer, Clarostat (VOL) (pot., modified)	1
R-4, S-10	381-NS-10K-S	1-76-0180	. Potentiometer, Clarostat (BFO) (pot., w/switch, modified)	1
R-5, S-12	381-NS-10K-Z	1-76-0171	. Potentiometer, Clarostat (INT MOD) (pot., w/switch, modified)	2
R-6, S-8	381-NS-10K-Z	1-76-0171	. Potentiometer, Clarostat (SQUELCH) (pot., w/switch, modified)	2
S-1	BP6040	1-16-0181	. Switch, Centralab (DEV/PWR) (rotary switch, modified)	1
S-2	51CD30-01-1-ATN	1-23-0358	. Switch, Grayhill (kHz) (modified)	1
S-3	CK-7101		. Switch, C & K (INT MOD-RCVR)	1
S-4	CK-7213		. Switch, C & K (AUTO-OFF-ZERO, BATT)	1
S-5	CK7207J1-03		. Switch, C & K (PWR-OFF-BATT)	1
S-6	CK7211		. Switch, C & K (REC WIDE, MID, NARROW)	1
S-7	CK7101		. Switch, C & K (GEN/RCVR)	1
S-9	CK7101		. Switch, C & K (INT MOD-RCVR)	1
S-11	CK7301		. Switch, C & K (AM-FM)	1
S-13	CK7101		. Switch, C & K (+40dB µV x 100 - NORM)	1
M-1		2-23-0003	. Meter Jewell 0-500µA (DEV/PWR)	1
	2-0871172-001		. . Jewell Bezell & Hardware kit	2

Dwg. 4-23-0474 Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
M-2		2-23-0002	. Meter, Jewell 500-0-500μA (FREQ. ERROR)	1
		1-09-0219-2	. Knob for kHz and DEV/PWR controls	2
		1-09-0219-1	. Knob, for Intensity, Focus, Horiz, & Vert position, INT MOD, BFO, VOL, ZERO RCVR SWEEP CAL & V/DIV CAL controls.	10
		1-09-0220	. Knob for SWEEP & EXT V/DIV controls	2
		2-23-0163	. Frame Support Member	1
		2-23-0164	. Frame Support Member	1
		2-23-0165	. Frame Support Member	1
		2-23-0166	. Frame Support Member	1
		2-23-0167	. Frame Support Member	1
		1-23-0188	. Tone Generator Assy.	1
		1-23-0433	. 7 Digit Freq. Select Switch Assy.	1
		1-23-0534	. Attenuator Assy.	1
		1-23-0580	. Wire Harness Assy.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0021		1-23-0188	Tone Generator Assy.	REF
		1-23-0018	. Frequency Switch Assy.	1
	177606MN		. . Switch Section, EECO/ Equiv.	5
	76 SM5		. . EECO/Equiv. Assy. kit	1
	M7PLRN		. . Male Connector Win-chester/Equiv. (7) pin	1
		1-23-0292	. . . Connector Mtg. Brkt.	1
		1-23-0046	. . Tone Generator Mother Bd.	1
		1-23-0190	. . Tone Generator Bd #1 Assy.	1
		1-23-0048	. . . Tone Gen. P.C. Bd. #1	1
X3 thru X8	SN74LS190N		. . . Logic TI/Equiv.	6
X2	SN7430N		. . . Logic TI/Equiv.	1
X9	SN7473N		. . . Logic TI/Equiv.	1
		1-23-0191	. . Tone Generator Bd. #2 Assy.	1
		1-23-0050	. . . Tone Gen. P.C. Bd #2	1
X11 & X12	SN7490N		. . . Logic TI/Equiv.	2
X10	SN7400N		. . . Logic TI/Equiv.	1
X1	MC4023P		. . . Logic MOTOROLA/ Equiv.	1
Q1 & Q4	2N2222		. . . Transistor SOLID STATE/Equiv.	2
Q3	2N3251		. . . Transistor SOLID STATE/Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
3-23-0021		1-23-0188	Tone Generator Assy. (Cont'd)	REF
Q2	2N4223		. . . Transistor SOLID STATE/Equiv.	1
CR1 & 2	FD333		. . . Diode FAIRCHILD/ Equiv	2
R-4	62-2-1-501		. . . Trim Pot. SPECTROL/ Equiv.	1
R-15	62-2-1-502		. . . Trim Pot. SPECTROL/ Equiv.	1
R8	62-2-1-203		. . . Trim Pot. SPECTROL/ Equiv.	1
		1-23-0192	. . Tone Generator Bd #3 Assy.	1
		1-23-0052	. . . Tone Gen. P.C. Bd. #3	1
X13	RC4558P		. . . IC TI/Equiv.	1
Q7 & 8	2N2222		. . . Transistor SOLID STATE/Equiv.	2
Q5	2N3251		. . . Transistor SOLID STATE/Equiv.	1
Q6	40673		. . . Transistor RCA/ Equiv.	1
CR3	1N823		. . . Zener Diode, DICKSON/Equiv.	1
CR4 thru 7	1N4148		. . . Diode, DICKSON/ Equiv.	4
R21, 26 & 30	62-1-1-202		. . . Trim pot., SPECTROL/ Equiv.	3
RY17	W107-DIP-1		. . . Relay, MAGNECRAFT/ Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
		1-23-0433	Frequency Select Switch (7) digit Assy.	REF
	197606MN		. BCD Switch Section, EECO/Equiv.	7
		1-23-0434	. Mother Board	1
	C931602		. IC Socket, TI/Equiv.	2
	E76SM		. End Piece, EECO/Equiv.	2
		1-23-0510	. Rod	2
		1-23-0534	Attenuator Assy	REF
		1-76-0159	. Attenuator, Modified CA 1000/50	1
		2-23-0027	. . Dial Index Ring	1
		2-23-0532	. . µvolt Dial	1
		2-23-0533	. . -dBm Dial	1
		1-23-0476	. . Attenuator Dial Stop	1
		2-23-0477	. . Knob	1
Dwg. Ref 4-23-0474		1-23-0580	Wire Harness Assy.	REF
P2 & P3	205210-1		. Male Connector (37) Pos. AMP/Equiv.	2
	205310-2		. .Crimp Pin, Male AMP/ Equiv.	44
	205202-4		. .Crimp Pin, Male AMP/ Equiv.	39
P-5	205206-1		. Male Connector (15) Pos. AMP/Equiv.	1
J-4	205205-1		. Female Connector (15) Pos. AMP/Equiv	1
	205311-3		. . Female Crimp Socket AMP/Equiv.	5
	205201-5		. . Female Crimp Socket AMP/Equiv.	3

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Reg. 4-23-0474		1-23-0580	Wire Harness Assy.	REF
	205980-1		. . Screw Retaining Kit AMP/Equiv.	4
J-8	M7SLRN		. Connector (7) Pos. Winchester/Equiv.	1
J-11	M5SLSH19C		. Connector (5) Pos. Winchester/Equiv.	1
J-8 & J-10	M7SLSH19C		. Connector (7) Pos. Winchester/Equiv.	2
J-7 & J-9	M9SLSH19C		. Connector (9) Pos. Winchester/Equiv.	2
	1N4148		. Diode (Mounted on S-4)	1

7.3 Upper Floor Assy. 1-23-0216

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
		1-23-0216	Upper Floor Assy.	REF
		3-23-0169	. Upper Floor Mtg. Plate	1
		1-23-0170	. . Hinge	2
		1-23-0171	. . Hinge Rod	1
		1-23-0225	. . Het. Amp. ÷ 2 Prescaler Assy.	1
		1-23-0217	. . Clock Divider Assy.	1
		1-23-0218	. . 10 MHz Oven Oscillator Assy.	1
		1-23-0538	. . Tune Summation Block Assy. (Effective S/N 485 thru 537)	1
		1-23-0566	. . Dual Buffer Amp. Assy. (Effective S/N 485 thru 537)	1
	SSV-0298		. . V.C.O. 1200-2200 MHz SOLID STATE (Effective S/N 485 thru 537)	1
		1-23-0560	. . 1200-2200 MHz Osc. Assy. (Effective S/N 440 thru 484 & 538 and on)	1
		3-23-0686	. . AGC System PC Bd. Assy. (Effective S/N 813 & S/N 882 & on).	1
Dwg. Ref. 3-23-0065		1-23-0225	Het. Amp. ÷ 2 Prescaler Assy. (Eff: Thru S/N 1169)	REF
		2-23-0148-1	. Het. Amp. ÷ 2 Prescaler P.C. Bd. Enclosure Base	1
		2-23-0148-2	. Het. Amp. ÷ 2 Prescaler P.C. Bd. Enclosure Cover	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref 3-23-0065		2-23-0321	. Het. Amp ÷ 2 Prescaler P.C. Bd. Assy.	1
X6501	MC1692L		. . IC, MOTOROLA/Equiv.	2
X6502	MC1616L		. . Logic, MOTOROLA/Equiv.	1
Q6501 thru 6506	2N2857		. . Transistor, RCA only	6
Dwg. Ref. 3-23-0685		3-23-0683	. Het. Amp. ÷ 2 P.C. Bd. Assy. (Effective S/N 1170)	1
X1	SN72741		. . Op. Amp., T.I./Equiv.	1
X2	MC1670		. . IC, MOTOROLA/Equiv.	1
Q1, 2 & 3	MRF911		. . Transistor, MOTOROLA/Equiv.	3
Q4	2N2222		. . Transistor, MOTOROLA/Equiv.	1
Dwg. Ref. 3-23-0062		1-23-0217	Clock Divider Assy.	REF
		2-23-0116-1	. Clock Divider Enclosure Base	1
		2-23-0116-2	. Clock Divider Enclosure Cover	1
		1-23-0093	. Clock Divider P.C. Bd. Assy.	1
J-11	M5PLRN		. . Connector, (5) pin Male, WINCHESTER/Equiv.	1
X6201 thru 6206	SN7490N		. . Logic, T.I./Equiv.	6
Q6201	2N3646		. . Transistor, GE/Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0062		1-23-0217	Clock Divider Assy. (cont'd)	REF
	5156-0000-09		. . Coax Connector, AMERICON	2
Dwg. Ref. 3-23-0007		1-23-0218	10 MHz Oven Oscillator Assy.	REF
		3-23-0108-1	. 10 MHz Oven Osc. Enclosure	1
	5156-0000-09		. . Connector, AMERICON	4
	M9PLRN		. . Connector, (9) Position, WINCHESTER	1
	1N4004		. . Diode, DICKSON/Equiv.	3
		1-23-0272	. 10 MHz Osc. Oven Control P.C. Bd. Assy.	1
		1-23-0020	. . 10 MHz Osc. Oven Control P.C. Bd.	1
X703A thru E	SN7404N		. . IC, TI/Equiv.	1
Q704	SJE1462		. . Transistor, MOTOROLA/Equiv.	1
X701 & 702	5H72741L		. . IC, TI/Equiv.	2
Q706	SJE1461		. . Transistor, MOTOROLA/Equiv.	1
Q705	66382		. . Transistor, RCA/Equiv.	1
D702	1N823		. . Zener Diode, MOTOROLA/Equiv.	1
D704 & D705	1N5231B		. . Zener Diode, DICKSON/Equiv.	2
D703	1N4148		. . Diode, DICKSON/Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref 3-23-0007		1-23-0218	10 MHz Oven Oscillator Assy. (cont'd)	REF
C-711	DV11PS35D		. . Trimmer Cap., JFD/ Equiv.	1
R-737	62-1-1-102		. . Trim Pot., SPECTROL/ Equiv.	1
R-722	62-1-1-202		. . Trim Pot., SPECTROL/ Equiv.	1
Dwg. Ref. 3-23-0007		1-23-0221	. 10 MHZ Oven Osc. P.C. Bd. Assy.	REF
		1-23-0006	. . 10 MHz Oven Osc. P.C. Bd.	1
R-711	#34 AW		. . Bare Nickel Chromium wire wrapped around Osc. Housing (60 ohms).	A/R
C-701	NVC-9GW		. . Piston Trimmer Cap, J.F.D.	1
Y-701	3-76-0063-60		. . Crystal, 10 MHz McCoy	1
Q703	2N3905		. . Transistor, NATIONAL/ Equiv.	1
Q701 & 702	66382		. . Transistor, RCA/Equiv.	2
D701	PCO600D		. . Diode, PARAMETRICS/ Equiv.	1
R-715	JA41J1		. . Thermistor, FENWAL/ Equiv.	1
Dwg. Ref. 2-23-0142		1-23-0538	. Tune Summation Attenuator Assy, (Eff: S/N 270 thru 537).	REF
		2-23-0536	. . Base Plate	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 2-23-0142		1-23-0538	. Tune Summation Attenuator Assy, (cont'd)	REF
	51-045-0000		. . Connector, Male SEALECTRO/Equiv.	2
	2051-1201		. . Connector, Male AMERICON/Equiv.	1
R-14206	62-1-1-503		. . Trim Pot., SPECTROL/Equiv.	1
Dwg. Ref. 2-23-0569		1-23-0566	. Dual Buffer Amp. Assy. (Effective S/N 485 thru 537 and 399 thru 537)	REF
		2-23-0567	. . Housing, Dual Buffer Amp.	1
		1-76-0272	. . Connector, Modified AMERICON/Equiv.	1
	859555-1		. . Feedthru Filter, AMP/Equiv.	1
		1-23-0565	. . Dual Buffer P.C. Bd. Assy.	1
		1-23-0564	. . Dual Buffer P.C. Bd.	1
	5156-0000-09		. . . Bulkhead Connector, AMERICON/Equiv.	2
Q1 thru Q4	MRF-911		. . . Transistor, MOTOROLA/Equiv.	4
	SSV-0298		. V.C.O. 1200-2200 MHz, SOLID STATE/Equiv (Eff: S/N 485 thru 537)	1
Dwg. Ref. 3-23-0558		1-23-0560	. 1200-2200 MHz Oscillator Assy. (Eff: S/N 440 thru 484 & 538 and on). This assy. is combination of Tune Summation, Oscillator and Dual Buffer circuits.	REF

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0558		1-23-0560	. 1200-2200 MHz Oscillator Assy. (Cont'd)	REF
	17-0219-000		. . Connector, AEP/Equiv.	2
L1 & L2	4514		. . Coil, J.W. MILLER/ Equiv.	2
		1-23-0559	. . 1200-2200 MHz Osc. P.C. Bd. Assy. (also contains Tune Sum. & Dual Buffer Circuitry)	1
		1-23-0556	. . . 1200-2200 MHz Osc. P.C. Bd.	1
Q1	2N2222		. . . Transistor, MOTOROLA/Equiv.	1
Q2	CD1857		. . . Transistor, CTC/ Equiv.	1
Q3 thru 6	MRF911		. . . Transistor, MOTOROLA	6
CR1 & 2	MA41502		. . . Diode MICROWAVE ASSOCIATES/Equiv.	2
R-2	62-1-1-503		. . . Trim Pot., SPECTROL/ Equiv.	1
Dwg. Ref. 2-23-0690		2-23-0686	. AGC System PC Bd. Assy.	REF
		1-23-0682	. . AGC System PC Bd.	1
X1, 3 4 & 6	CA3130		. . IC, RCA/Equiv.	4
X5	CD4066		. . IC, RCA/Equiv.	1
X2	CD4029		. . IC, RCA/Equiv.	1
Q1	2N2222		. . Transistor, MOTOROLA/ Equiv.	1
Q2	3N128		. . Transistor, MOTOROLA/ Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 2-23-0690		2-23-0686	. AGC System PC Bd. Assy. (cont'd)	REF
CR1 & 2	1N4148		. . Transistor, DICKSON/ Equiv.	1
SW1 thru SW4	435166-2		. . Switch, Amp/Equiv.	1

7.4 Rear Panel Assy. 1-23-0380

Dwg. Ref 3-25-0403 Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
		1-23-0380	Rear Panel	REF
T18001	NT-2310	2-76-0182	. Transformer, National	1
		1-23-0359	. Transformer Mounting Block	1
		1-23-0381	. Support Foot	1
		1-23-0382	. Support Foot	3
		2-23-0226	. Support Rail	2
		2-23-0153	. Support Rail	2
	HKP		. Fuse Holder BUSS	3
F18001	MDL-1.25		. Fuse, 1.25A BUSS, SLO-BLO	1
F18002			. Fuse, 7½A BUSS	1
F18003			. Fuse, 7½A BUSS	1
BR18001	PK-10		. Rectifier, ELECTRONIC DEVICES	2
	P2406-AB		. CINCH male AC plug	1
		2-23-0136	. . AC Plug Housing	1
CB18001	TS-35A		. Thermostat, HAMLIN	1
		3-23-0118	. Internal Battery Cover	1
TB 2,3	014-3000		. . Telfon Terminal SELECTRO	2
TB-1	4-170		. . CINCH Terminal Block	1
CR18002	1N4736A		. . Zener Diode	1
CR18001	NS-2001		. . Diode, SOLITRON	1
J-5,12	205205-1		. AMP 15 Position Female Connector	2

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0403			Rear Panel Assy. (cont'd)	REF
	205201-5		. . Female Crimp Pins	30
		1-76-0246	. Fixed Attenuator, WEINSCHEL	1
FAN 18001	19A2649	1-76-0279	. Fan, TRW, Modified	1
		1-00-0154	. . Fan Housing	1
		1-23-0456	. . Vibration Damper	1
		1-76-0245	. Battery Modified GATES	1
		3-23-0075	. Battery Cover	1
		1-23-0384	. Duty Cycle Regulator & Battery Charger Assy.	1
Dwg. Ref. 3-23-0051		1-23-0384	Duty Cycle Regulator Assy.	REF
		2-23-0377	. Side Cover	1
		3-23-0376	. Rear Cover	1
		2-23-0375	. . Heat Sink Plate	1
	014-2021-000-689		. . SEALECTRO Telfon Terminal	4
CR-5103 thru 5106 CR-5118 & 5119	NS-2001		. . SOLITRON Diode	6
Q5102 & Q5112	2N5879		. . MOTOROLA Transistor	2
Q5110	2N6109		. . RCA Transistor	1
Q5101	2N5195		. . Motorola Transistor	1
		1-23-0090	. Duty Cycle Regulator Assy.	1
		2-23-0374	. . Duty Cycle Regulator P.C. Bd. Mtg. Brkt.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0051		1-23-0384	Duty Cycle Regulator Assy. (cont'd)	REF
		2-23-0373	. . Duty Cycle Regulator P.C. Bd. Mtg. Brkt.	1
	.125F401 S 2-14		. . ANSLEY FLEX Strip	A/R
		2-23-0378	. . Duty Cycle Regulator Base Plate	1
	51-708-001		. . Feed thru Filter SPECTRUM Controls	6
P-12	205206-1		. . AMP (15) Position Connector	1
	205202-4		. . . AMP Female Crimp	15
		2-23-0098	. . Duty Cycle Regulator P.C. Bd. Assy.	1
	350-2188-09-07		. . . Threaded standoff CAMBION	4
X5101	MC1709CG		. . . MOTOROLA/Equiv. I.C.	1
X5102	SN72741L		. . . TEXAS INST/Equiv. I.C.	1
Q5107 & Q5108	2N2405		. . . MOTOROLA/Equiv. Transistor	2
Q5103 & Q5104	2N3646		. . . GE/Equiv. Transistor	2
Q5106	2N3905		. . . NATIONAL/Equiv. Transistor	1
Q5105, 5109 & 5111	2N3251		. . . GE/Equiv. Transistor (Metal)	3
CR5117	1N4002		. . . ITT/Equiv. Diode	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0051		1-23-0384	Duty Cycle Regulator Assy. (cont'd)	REF
CR5101 & CR5102 & CR5110 thru CR5115	1N4148		. . . DICKSON/Equiv. Diode	8
CR5108 5109 & CR5116	1n5234		. . . MOTOROLA/Equiv. Zener Diode	3
R5116	62-2-1-102		. . . SPECTROL/Equiv. Trim Pot.	1
R5123	62-2-1-502		. . . SPECTROL/Equiv. Trim Pot	1
		1-23-0349	. . Toroid Mounting P.C. Bd. Assy.	1
		1-23-0340	. . . Toroid Mounting P.C. Bd.	1
		1-23-0296	. . . XFMR Mounting Hub	1
T5101		1-76-0155	. . . Inverter Transformer	1
		1-23-0217-2	. . . Toroid Mounting Hub	4
L5101 thru 5104		1-76-0162	. . . Toroid	4
CR5107	NS2002		. . . SOLITRON/Equiv. Diode.	1

7.5 Lower Floor Assy. 1-23-0492

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
		1-23-0492	Lower Floor Assy.	REF
		3-23-0102	. Under Scope Mtg. Plate	1
		1-00-0169-1	. Hinge Assy.	2
		1-23-0483	. 120 MHz Receiver Assy.	1
		3-23-0484-1	. . 120 MHz Receiver P.C. Bd. Enclosure Base	1
		3-23-0484-2	. . 120 MHz Receiver P.C. Bd. Enclosure Cover	1
		1-23-0219	. 100 MHz Amp. 108 Mixer Assy.	1
		3-23-0151-1	. . 100 MHz Amp. 108 Mixer P.C. Bd. Enclosure	1
		3-23-0151-2	. . 100 MHz Amp. 108 Mixer P.C. Bd. Enclosure Cover	1
		1-23-0495	. FM/AM Generator Assy.	1
		3-23-0137-1	. . FM/AM Gen. P.C. Bd. Enclosure Base	1
		3-23-0137-3	. . FM/AM Gen. P.C. Bd. Enclosure cover	1
Dwg. Ref 3-23-0481		1-23-0483	120 MHz Receiver Assy.	REF
		1-23-0482	. 120 MHz Rcvr P.C. Bd. Assy	1
		1-23-0481	. . 120 MHz Rcvr P.C. Bd.	5

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref 3-23-0481		1-23-0483	120 MHz Receiver Assy.	REF
Q6701, 6702, 6703, 6708 & 6709	40673		. . Transistor, RCA/ Equiv.	5
Q6704, 6705, 6706 & 6710	2N2222		. . Transistor, MOTO-ROLA/Equiv.	4
Q6707	2N3905		. . Transistor, NATIONAL/ Equiv.	1
Y6701	3-76-0063-62		. . Crystal, K-W/Equiv.	1
Y6702	3-76-0063-19		. . Crystal, K-W/Equiv.	1
CR6703 thru 6707	MA47047		. . Diode, MICROWAVE ASSOC./Equiv.	5
CR6708	1N4148		. . Diode, DICKSON/ Equiv.	1
R6718 & 6742	2H202		. . Thermistor, MIDWEST COMPONENTS/Equiv.	2
Dwg. Ref. 3-23-0061		1-23-0219	100 MHz Amp. 108 Mixer Assy.	REF
		1-23-0095	. 100 MHz Amp. 108 Mixer P.C. Bd. Assy.	1
		1-23-0064	. . 100 MHz Amp. 108 Mixer P.C. Bd.	1
Q6101, 6102, 6105, 6106 & 6107	40673		. . . Transistor, RCA	5

Ref. Symbol	Part No.	IFR. Stock No.	Description	Qty Per Assy
Dwg. Ref 3-23-0061		1-23-0219	100 MHz Amp. 108 Mixer Assy. (cont'd)	REF
Q6103, 6104 & 6108	66382		. . . Transistor, RCA/ Equiv.	3
Dwg. Ref 3-23-0497		1-23-0495	FM/AM Generator Assy.	REF
		1-23-0496	. FM/AM Generator P.C. Bd. Assy.	1
		2-23-0264	. . FM/AM Generator P.C. Bd. Assy.	1
Y26201		3-76-0063-18	. . . Crystal, 10MHz	1
Y26202		3-76-0063-77	. . . Crystal, 54.78 MHz	1
CR26201 & 26212	PC0605D		. . . Diode, PARAMETRICS/ Equiv.	2
CR26204 & 26205	MA47047		. . . Diode, MICROWAVE ASSOC./Equiv.	2
CR26206, 26207, 26209,& 26210 26211	1N4148		. . . Diode, DICKSON/ Equiv.	5
CR26208 & 26213	5082-2800		. . . Diode, HEWLETT-PACKARD/Equiv.	2
R26218 & 26219	62-1-1-201		. . . Trim Pot., SPEC-TROL	2
X26201	LM741CH		. . . IC, NATIONAL	1
X26202	SN74S-112H		. . . IC, TI/Equiv.	1
X26203 26204 & 26205	SN7490N		. . . IC, TI/Equiv.	3

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0497		1-23-0495	FM/AM Generator Assy. (cont'd)	REF
X26206	SN7473N		. . . IC, TI/Equiv.	1
Q26201 26210 & 26211	2N2222		. . . Transistor MOTOROLA/Equiv.	3
Q26202 & 26203	2N3903		. . . Transistor, NATIONAL/Equiv.	2
Q26204	2N3905		. . . Transistor, NATIONAL/Equiv.	1
Q26205 & 26206	40673		. . . Transistor, NATIONAL/Equiv.	2
Q26207 & 26209	66382		. . . Transistor, RCA/Equiv.	2
Q26208	2N4416		. . . Transistor, NATIONAL/Equiv.	1
Q26212	2N3251		. . . Transistor, NATIONAL/Equiv.	1

7.6 Mother Board Assy. 1-23-0581

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 4-23-0474		1-23-0581	Mother Board Assy.	REF
		3-23-0470	. Mother Board	1
	67762-1		. Card Guide, AMP	3
J-13	50-30A-30		. Connector, CINCH	2
		1-23-0573	. . 250 kHz IF Monitor, Audio P.C. Bd. Assy.	1
J-14	50-22A-20		. Connector, CINCH	1
		2-23-0437-1	. . Shield, Connector	1
		2-23-0473-2	. . Shield, Connector	1
		1-23-0424	. . 79-80 MHz Phase Lock Loop P.C. Bd. Assy.	1
		3-23-0442	. . 79-80 MHz Phase Lock Loop P.C. Bd. Enclosure	1
J-15	50-15A-20		. Connector, CINCH	2
		2-23-0472-1	. . Shield, Connector	1
		2-23-0472-2	. . Shield, Connector	1
		1-23-0493	. . High Frequency Phase Lock Loop P.C. Bd. Assy.	1
		3-23-0485	. . High Frequency Phase Lock Loop P.C. Bd. Enclosure	1

Ref. Symbol	Part No.	IFR. Stock No.	Description	Qty Per Assy
J-16	50-15A-20		. Connector, CINCH	2
		1-23-0423	. . V.C.O. Tuner P.C. Bd. Assy.	1
		2-76-0001-63	. . Standoff	1
		1-23-0426	. . . V.C.O. Tuner P.C. Bd. Retainer	1
J-17	50-30A-30		. Connector, CINCH	2
		1-23-0091	. . Regulator and Power Supply P.C. Bd. Assy.	1
		1-23-0554	. 1200 MHz Amp. Assy.	1
		1-23-0516	. 1080 MHz Mult./Amp. Assy.	1
		2-23-0274	. . 1080 MHz Mult./Amp Mtg. Brkt.	1
		1-23-0602	. Static Discharge Protector Assy. (Effective S/N 575 & on)	1
		1-23-0468	. Static Discharge Protector Assy. (Effective S/N 574)	1
J-3	205713-1		. Connector, Female AMP	1
J-2	205209-1		. Connector, Female AMP	1
P-6	205204-1		. Connector, Male AMP	1
	205980-1		. . Screw Retaining Kit AMP	1
		2-23-0542	. Frequency Select Flex. Strip (Y connector)	1
	3416		. . Plug, 3M DIP Pin	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
		2-23-0543	. Frequency Select Flex Strip (X connector)	1
	3416		. . Plug, 3M DIP Pin	1
Q4215	SJE1461		. Transistor, MOTOROLA/ Equiv.	1
	MK77-1-2		. . Transistor Mtg. Kit, MOTOROLA/Equiv.	1
Q4208	SJE1462		. Transistor, MOTOROLA/ Equiv.	1
	MK77-1-2		. . Transistor Mtg. Kit, MOTOROLA	1
Dwg. Ref. 4-23-0605		1-23-0573	. 250 kHz IF Monitor, Audio P.C. Bd. Assy.	REF
		2-23-0572	. . 250 kHz IF Monitor, Audio P.C. Bd.	1
X1, X2, X7, X8	CA3130T		. . . I.C., RCA/Equiv.	4
X3, X4, X9	MC1458		. . . Dual Op. Amp. MOTOROLA/Equiv.	3
X5, X6	CD4066		. . . Quad Switch, RCA/ Equiv.	2
X10	MC1709CG		. . . I.C. MOTOROLA/ Equiv.	1
X11	LM380N		. . . Audio Amp., NATIONAL/Equiv.	1
X12	LM741CH		. . . I.C., NATIONAL/ Equiv.	1
Q1	40673		. . . Transistor, RCA/ Equiv.	1
Q2, 8 9, 10, 11, 14 & 15	2N2222		. . . Transistor, MOTO-ROLA/Equiv.	7

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 4-23-0605		1-23-0573	. 250 kHz IF Monitor, Audio P.C. Bd. Assy. (cont'd)	REF
Q3	2N3905		. . . Transistor, NATIONAL/Equiv.	1
Q4	2N3903		. . . Transistor, NATIONAL/Equiv.	1
Q5, 6, 7, 12, & 13	2N3251		. . . Transistor, NATIONAL/Equiv.	5
Q16	2N3646		. . . Transistor, GE/Equiv.	1
CR1 thru 7 & CR10 thru 21	1N4148		. . . Diode, DICKSON/Equiv.	18
CR8, 9	1N5231		. . . Zener Diode, DICKSON/Equiv.	2
R27, 42 & 64	62-1-1-102		. . . Trim Pot., SPECTROL/Equiv.	3
R-41	62-1-1-202		. . . Trim Pot., SPECTROL/Equiv.	1
R-39, 44, & 66	62-1-1-502		. . . Trim Pot., SPECTROL/Equiv.	3
R-7, 8, 68, & 80	62-1-1-103		. . . Trim Pot., SPECTROL/Equiv.	4
R-52, 70 & 109	62-1-1-503		. . . Trim Pot., SPECTROL/Equiv.	3
Dwg. Ref. 3-23-0425		1-23-0424	. 79-80 MHz Phase Lock Loop P.C. Bd. Assy.	REF
		1-23-0498	. . 79-80 MHz Phase Lock Loop P.C. Bd.	1
X1 & X8	MC120-13L		. . . IC, MOTOROLA/Equiv.	2

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0425		1-23-0424	. 79-80 MHz Phase Lock Loop P.C. Bd. Assy. (cont'd)	REF
X2	72741L		. . . IC, TI/Equiv.	1
X3 & X4	SN7473N		. . . IC, TI/Equiv.	2
X5	SN7420N		. . . IC, TI/Equiv.	1
X6	SN7402N		. . . IC, TI/Equiv.	1
X7	SN7400N		. . . IC, TI/Equiv.	1
X9, 10 11, 12, 13 & 14	SN74190N		. . . IC, TI/Equiv.	6
Q1, 12 & 13	2N2222		. . . Transistor, SOLID STATE/Equiv.	3
Q3	2N4223		. . . Transistor, NATIONAL/Equiv.	1
Q4 & 5	2N3646		. . . Transistor, FAIRCHILD/Equiv.	2
Q6, 7, 9, 10 & 14	66382		. . . Transistor, FAIRCHILD/Equiv.	5
Q8	2N4416		. . . Transistor, MOTOROLA/Equiv.	1
Q11 & 2	2N3251		. . . Transistor, NATIONAL/Equiv.	2
CR1 & 2	FD333		. . . Diode, FAIRCHILD/ Equiv.	2
CR5	PC0605D		. . . Diode, PARAMETRICS/ Equiv.	1
CR6	5082-2800		. . . Diode, HEWLETT-PACKARD/Equiv.	1
CR7	1N823A		. . . Zener Diode, DICKSON/Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref 3-23-0425		1-23-0424	. 79-80 MHz Phase Lock Loop P.C. Bd. Assy. (cont'd)	REF
CR8	1N4148		. . . Diode, DICKSON/ Equiv.	1
R-32	62-1-1-202		. . . Trim Pot, SPECTROL/ Equiv.	1
Dwg. Ref. 3-23-0396		1-23-0493	. High Freq. Phase Lock Loop P.C. Bd. Assy.	REF
		3-23-0501	. . High Freq. Phase Lock P.C. Bd.	1
X3201 & 3208	SN7473N		. . . IC, TI/Equiv.	2
X3202	MC12013L		. . . IC, MOTOROLA/Equiv.	1
X3203, 3204, & 3205	SN74190N		. . . IC, TI/Equiv.	3
X3206 & X3209	SN7410N		. . . IC, TI/Equiv.	2
X3207	SN7490		. . . IC, TI/Equiv.	1
X3210	SN7420N		. . . IC, TI/Equiv.	1
X3211	SN7400N		. . . IC, TI/Equiv.	1
X3212	SN74121N		. . . IC, TI/Equiv.	1
Q3201, 3204 & 3205	66382		. . . Transistor, RCA/ Equiv.	3
Q3202	2N2405		. . . Transistor, MOTO-ROLA/Equiv.	1
Q3203, 3206, 3207, 3209, 3210, & 3215	2N5251		. . . Transistor, SOLID STATE/Equiv.	6

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0396		1-23-0493	. High Freq. Phase Lock Loop P.C. Bd. Assy.	REF
Q3206 & 3208	2N4223		. . . Transistor, NATIONAL/Equiv.	2
Q3216 & 3211	2N2222		. . . Transistor, SOLID STATE/Equiv.	2
Q3212, 3213 & 3214	2N3646		. . . Transistor, FAIRCHILD/Equiv.	3
CR3201 thru 3206	1N4148		. . . Diode, DICKSON/ Equiv.	6
R3237	62-1-1-202		. . . Trim pot., SPECTROL/ Equiv.	1
Dwg. Ref. 3-23-0038		1-23-0423	. V.C.O. Tuner P.C. Bd. Assy.	REF
		1-23-0394	. . V.C.O. Tuner P.C. Bd.	1
RY3801	W172 DIP -3		. . . Relay, MAGNACRAFT/ Equiv.	1
RY3802 thru 3806	W117 DIP -3		. . . Relay, MAGNACRAFT/ Equiv.	5
X3801	SN74145N		. . . IC, TI/Equiv.	1
Q3801, 3802, & 3804	2N2222		. . . Transistor, MOTOROLA/Equiv.	3
Q3803 & 3805	2N2905		. . . Transistor, FAIRCHILD/Equiv.	2
Q3806	2N2405		. . . Transistor, RCA/ Equiv.	1
Q3807 thru 3811	2N3251		. . . Transistor, (Metal only) SOLID STATE/ Equiv.	5

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0038		1-23-0493	. V.C.O. Tuner P.C. Bd. Assy. (cont'd)	REF
D3801 thru 3806	1N4148		. . . Diode, DICKSON/ Equiv.	6
R3808 & 3825	62-2-1-202		. . . Trim Pot., SPEC-TROL/Equiv.	2
R3811	62-2-1-504		. . . Trim Pot., SPEC-TROL/Equiv.	1
R3815 & 3820	62-2-1-102		. . . Trim Pot., SPEC-TROL/Equiv.	2
R3816, 3821 & 3826	62-2-1-204		. . . Trim Pot., SPEC-TROL/Equiv.	3
R3830 & 3835	62-2-1-502		. . . Trim Pot., SPEC-TROL/Equiv.	2
R3831	62-2-1-503		. . . Trim Pot., SPEC-TROL/Equiv.	1
Dwg. Ref. 3-23-0042		1-23-0091	. Regulator & Power Supply P.C. Bd. Assy.	REF
		2-23-0060	. . Regulator & Power Supply P.C. Bd.	1
X4201	SN72558L		. . . IC, TI/Equiv.	1
X4202, 4203, & 4204	SN72741L		. . . IC, TI/Equiv.	3
Q4201, 4204, 4206, 4207, 4209, 4211, 4220, & 4222	2N3251A or 2N5366		. . . Transistor, MOTO-ROLA/Equiv.	8

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy.
Dwg. Ref. 3-23-0042		1-23-0091	. Regulator & Power Supply P.C. Bd. Assy. (cont'd)	REF
Q4204, 4203, 4212, 4218 & 4219	2N2222		. . . Transistor, MOTOROLA/Equiv.	5
Q4205	UC-714		. . . Transistor, NATIONAL/Equiv.	1
Q4210	SJE-1462		. . . Transistor, MOTOROLA/Equiv.	2
Q4123	2N2405		. . . Transistor, MOTOROLA/Equiv.	1
Q4214 & 4216	2N3905		. . . Transistor, NATIONAL/Equiv.	2
Q4215	SJE-1461		. . . Transistor, MOTOROLA/Equiv.	1
Q4217, 4221, 4223 & 4224	2N2905		. . . Transistor, RCA/Equiv.	4
CR4201, 4202, 4203, 4204, 4205, 4207, 4212, 4213, 4214, 4215, & 4217	1N4148		. . . Diode, DICKSON/Equiv.	11
CR4206	1N823		. . . Diode, DICKSON/Equiv.	1
CR4208	1N5234B		. . . Diode, DICKSON/Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy.
Dwg. Ref. 3-23-0042		1-23-0091	. Regulator & Power Supply P.C. Bd. Assy. (cont'd)	REF
CR4209, 4216	HP2800		. . . Diode, DICKSON/ Equiv.	2
CR4211	1N270		. . . Diode, DICKSON/ Equiv.	1
R4214, 4224 & 4233	62-2-1-502		. . . Trim Pot., SPECTROL/ Equiv.	3
R4227 & 4242	62-2-1-103		. . . Trim Pot., SPECTROL/ Equiv.	2
R4241	62-2-1-102		. . . Trim Pot., SPECTROL/ Equiv.	1
R4244	62-2-1-202		. . . Trim Pot., SPECTROL/ Equiv.	1
Dwg. Ref. 2-23-0548		1-23-0544	. 1200 MHz Amplifier Assy.	REF
		2-23-0552	. . Housing, 1200 MHz AMP	1
		2-23-0553	. . Cover, 1200 MHz AMP	1
		1-23-0547	. . 1200 MHz AMP. P.C. Bd.	1
Q4801, 4802 & 4803	MRF911		. . . Transistor, TI/ Equiv.	3
Dwg. Ref. 2-23-0546		1-23-0516	. 1080 MHz Multiplier/ Amplifier Assy.	REF
		2-23-0517	. . Mounting Plate, 1080 MHz Mult/AMP. P.C. Bd.	1
		1-23-0513	. . 1080 MHz Mult/AMP P.C. Bd. Assy.	1
		1-23-0512	. . . 1080 MHz Mult/AMP P.C. Bd.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 2-23-0546		1-23-0516	. 1080 MHz Multiplier/ Amplifier Assy.	REF
Q4601	66382		. . . Transistor, RCA/ Equiv.	1
Q4602	2N5109		. . . Transistor, MOTO-ROLA/Equiv.	1
CR4601 & 4602	1N4148		. . . Diode, DICKSON/ Equiv.	2
CR4603	HP5082-2800		. . . Diode, HP/Equiv.	1
CR4604 or	HP5082-0180		. . . Diode, HP/Equiv.	1
CR4604	MA44300		. . . Diode, MA/Equiv.	
C-4610	GYC4004		. . . Trimmer Cap., SPRAGUE-GOODMAN	1
C4612	NVC9GW		. . . Trimmer Cap., JFD/ Equiv.	1
Dwg. Ref. 1-23-0457		1-23-0602	. Static Discharge Pro-tector Assy. (Eff: S/N 575 & on)	REF
		1-23-0600	. . Terminal Plate	1
CR5701 thru 5708	MA47047		. . . Diode, MICROWAVE ASSOC/Equiv.	8
Dwg. Ref. 1-23-0457		1-23-0468	. Static Discharge Pro-tector Assy. (Eff: up thru S/N 574)	REF
		1-23-0466	. . Static Discharge Pro-tector P.C. Bd.	1
CR5701 thru 5708	MA47047		. . . Diodes, MICROWAVE ASSOC/Equiv.	8

7.7 "Hex Block Rail" Assy.

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
		2-23-0290	Mounting Bracket	REF
		1-76-0190	. Relay, Change-over	1
		2-23-0144	. . Mounting Bracket	1
		1-23-0228	. . Power Monitor Assy.	1
		1-23-0297	. 1200 MHz Filter/Diode Sw. Assy.	1
		1-23-0402	. 108 MHz Bandpass Filter Assy.	1
		1-23-0097	. High Freq. Multiplier Mixer Block Assy. (Hex Block)	1
Dwg. Ref 1-23-0111		1-23-0228	Power Monitor Assy.	REF
		2-23-0337	. Power Monitor Block	1
R11101	62D-31250		. . Resistor, PYROFILM/ Equiv.	1
C11101	FA5C-102W		. . Capacitor, ALLEN-BRADLEY/Equiv.	1
CR11101	MS-324		. . Diode, SOLITRON MICROWAVE/Equiv.	1
Dwg. Ref 1-23-0124		1-23-0297	1200 MHz Filter Diode Switch Assy.	REF
		3-23-0287	. 1200 MHz Filter Block	1
C12401	FA5C-102W		. . Capacitor, ALLEN-BRADLEY	1
L12401 thru 12406	1025-08		. . Choke, DELEVAN/ Equiv.	6
C12401 thru 12412	MA47047		. . Diode, MICROWAVE ASSOC./Equiv.	12

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref 1-23-0421		1-23-0402	108 MHz Bandpass Filter Assy.	REF
		2-23-0398	. Housing Block	1
C2 thru C5	VC26G		. . Trimmer Capacitor, JFD/Equiv.	4
C1 & C6	DM05-020D		. . NPO Disc Cap., ARCO/Equiv.	2
Dwg. Ref 3-23-0082		1-23-0097	High Freq. Multi. Mixer (Hex Block) Assy.	REF
		3-23-0068	. Mixer Block	1
CR8203	PR-161		. . Diode, PARAMETRICS/ Equiv.	1
CR8204 thru 8213	MA47047		. . Diode, MICROWAVE ASSOC./Equiv.	10
CR8214	MS324		. . Diode, SOLITRON/Equiv.	1
J-6	205203-1		. . Connector, (9) Pos. AMP/Equiv.	1
	205311-9		. . . Pin, Female AMP/ Equiv.	1
		1-23-0101	. High Freq. Mult. Mixer AMP Bd. Assy.	1
		1-23-0133	. . High Freq. Mult. Mixer AMP P.C. Bd.	1
Q8201 & 8202	2N5109		. . . Transistor, MOTO-ROLA only	2
CR8201 & 8202	1N4148		. . . Diode, SOLID STATE/Equiv.	2
C8207	GYC40004		. . . Vari Ceramic Cap., SPRAGUE-GOODMAN/ Equiv.	1

7.8 Assemblies on Upper Right Rail

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
		1-23-0591	100 MHz Filter Assy.	1
		1-23-0250	1st Mixer Assy.	1
		1-23-0462	2nd Mixer Assy.	1
Dwg. Ref. 2-23-0300		1-23-0591	100 MHz Filter Assy.	REF
		2-23-0592-1	. 100 MHz Filter Housing Base	1
		2-23-0592-2	. 100 MHz Filter Cover	1
		1-23-0303	. 100 MHz Filter P.C. Bd. Assy.	1
		1-23-0301	. . 100 MHz Filter P.C. Bd.	1
Q3001	40673		. . . Transistor, RCA/ Equiv.	1
Dwg. Ref. 1-23-0276		1-23-0250	1st Mixer Assy.	REF
		2-23-0335	. 1st Mixer Block	1
		1-23-0336	. 1st Mixer Block Cover	1
MXR 27601	MD614		. . Mixer, ANZAC/Equiv.	1
CR27601, 27602 & 27605	PSO-83B		. . Diode, PARAMETRICS	3
CR27603	MS324		. . Diode, SOLITRON/Equiv.	1
Dwg. Ref. 2-23-0475		1-23-0462	2nd Mixer Assy.	REF
		2-23-0461	. 2nd Mixer Block Cover	1
		3-23-0460	. 2nd Mixer Block	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 2-23-0475		1-23-0462	2nd Mixer Assy. (cont'd)	REF
CR1 thru CR10	MA47047		. . Diode, MICROWAVE ASSOC./Equiv.	10
CR11	HP2800		. . Diode, HP/Equiv.	1
CR16, 17 & 18	1N4148		. . Diode, DICKSON/ Equiv.	3
	MD-113		. . Mixer, ANZAC/Equiv.	1
		2-23-0529	. 40 dB Booster Block	1
CR12, 13, 14 & 15	MA47047		. . Diode, MICROWAVE ASSOC/Equiv.	4

7.9 Oscilloscope Assy. 1-23-0194

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref 3-23-0034		1-23-0194	Oscilloscope Assy. (Effect: Thru S/N 1069)	REF.
		3-23-0195	. Front Plate	1
		1-23-0016	. Graticule	1
	3RP-1		. CRT, RCA/Equiv.	1
		3-23-0105	. Side Plate, Right	1
		3-23-0106	. Side Plate, Left	1
		2-23-0107	. Scope Frame Upper Mounting Plate	1
		1-23-0130	. Scope Inverter Board Assy.	1
		1-23-0076	. Scope Main Board Assy.	1
		2-23-0140	. Frame Rear Cover	1
R3481		1-76-0161	. Potentiometer (HORIZ. CTR) (Modified Clarostat RVGNAYSDO12A)	1
R3443		1-76-0148-1	. Potentiometer (VERT. CTR) (Modified Clarostat RVGNAYSD103A)	1
Dwg. Ref 3-23-0034		1-23-0130	. Scope Inverter Board Assy.	REF
		2-23-0127	. Scope Inverter P.C. Bd.	1
BR3401	VH248		. . Bridge Rectifier, VARO/Equiv.	1
CR3408 & 3409	MR250-5		. . Diode, MOTOROLA/ Equiv.	2

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0034		1-23-0130	Scope Inverter Board Assy.	REF
CR3401 thru 3413	1N4004		. . Diode, MOTOROLA/ Equiv.	4
L3401		2-76-0260	. . Toroid Inductor	1
T3401		2-76-0240	. . Transformer, PRE-CISION WINDING/ Equiv.	1
R3487		1-76-0169	. . Potentiometer (IN-TENSITY)	1
R3485		1-76-0170	. . Potentiometer (FOCUS)	1
Dwg. Ref. 3-23-0034		1-23-0076	Scope Main Board Assy.	REF
		2-23-0299	. Scope Main P.C. Bd.	1
X3401	LM741L		. . IC, NATIONAL/Equiv.	1
X3402	LM709CH		. . IC, TI/Equiv.	1
X3403	CA3100T		. . IC, RCA/Equiv.	1
Q3401	2N2905		. . Transistor, FAIR-CHILD/Equiv.	1
Q3402	2N3956		. . Transistor, dual FET/Equiv.	1
Q3403, 3406 & 3415	2N2222		. . Transistor, SOLID STATE/Equiv. (metal can)	3
Q3404, 3405, 3410, 3414 & 3416	40321		. . Transistor, RCA/ Equiv.	5
Q3407, 3412, 3413	2N3251		. . Transistor, SOLID STATE/Equiv.	3

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0034		1-23-0076	Scope Main Board Assy.	REF
Q3408, 3409	2N3646		. . Transistor, NATIONAL /Equiv.	2
Q3411	2N2405		. . Transistor, RCA/Equiv.	1
CR3401 & 3415	1N5234B		. . Diode, Zener, DICKSON/Equiv.	2
CR3402 thru 3407 & 3416 thru 3419	1N4148		. . Diode, DICKSON/ Equiv.	10
CR3414	1N5231B		. . Diode, Zener, DICKSON/Equiv.	1
RY3401 & 3402	W172DIP-3		. . Relay	2
R3422		1-23-0077	. . Potentiometer (VERT GAIN) control	1
R3463		1-23-0078	. . Potentiometer (HORIZ SWEEP VERN)	1
R3406	62-1-1-202		. . Trim Pot., SPECTROL/ Equiv.	1
R3419	62-2-1-201		. . Trim Pot., SPECTROL/ Equiv.	1
R3422	62-2-1-103		. . Trim Pot., SPECTROL/ Equiv.	1
R3427	62-2-1-503		. . Trim Pot., SPECTROL/ Equiv.	1
R3463	62-2-1-203		. . Trim Pot., SPECTROL/ Equiv.	1
R3472	62-2-1-102		. . Trim Pot., SPECTROL/ Equiv.	1
R3476	62-1-1-502		. . Trim Pot., SPECTROL/ Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0034		1-23-0076	Scope Main Board Assy. (cont'd)	REF
S3401	5P6042		. . 7 Pos., 3 Pole sw., CTS/Equiv.	1
S3402	CK-7303		. . TPDT CTR OFF sw., CTS/Equiv.	1
S3403	5P6043		. . 5 Pos., 2 Pole Pot. sw., CTS/Equiv.	1

7.9-1 Oscilloscope Assy. 1-23-0700

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0703		1-23-0700	Oscilloscope Assy. (Eff: S/N 1070 & on)	REF
		1-23-0016	. Graticule	1
	3RP-1		. CRT, RCA/Equiv.	1
		3-23-0622	. Side Frame, Right	1
		3-23-0631	. Side Frame, Left	1
		1-23-0624	. Inverter P.C. Bd. Assy.	1
		1-23-0625	. Main P.C. Bd. Assy.	1
S-65601		1-23-0668	. . Vert. Gain Switch Assy.	1
R-65603		1-23-0077	. . Vert. Gain Control Pot.	1
S-65602	CK7303		. . TPDT, Ctr. OFF switch C & K/Equiv.	1
S-65603		3-23-0667	. . Horiz. Sweep Switch Assy.	1
R-65602		1-23-0078	. . Horiz. Sweep Control & Switch Assy.	1
		3-23-0701	. Front Plate Assy.	1
R-65604		1-76-0148-1	. . Vert. Center Control	1
R-65601		1-76-0161	. . Horiz. Center Control	1
3-23-0665		1-23-0624	. Scope Inverter P.C. Bd. Assy.	REF
		1-23-0606	. . Scope Inverter P.C. Bd.	1
BR-1	VH248		. . Bridge Rectifier, VARO/Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 3-23-0665		1-23-0624	. Scope Inverter P.C. Bd. Assy.	REF
CR1 & 2	MR250-5		. . Diode, MOTOROLA/ Equiv.	2
CR3 thru CR6	1N4004		. . Diode, DICKSON/ Equiv.	4
CR7	1N4148		. . Diode, DICKSON/ Equiv.	1
CR8	1N5278B		. . Zener Diode, (170V) MOTOROLA/Equiv.	1
Q1	40321		. . Transistor, RCA/Equiv.	1
Q2 & 3	SJE1461		. . Transistor, MOTOROLA/ Equiv.	2
Q4	2N2222		. . Transistor, MOTOROLA/ Equiv.	1
U-1	HP5082-4350		. . Opto-Isolator, HP/ Equiv.	1
R-6	CM42300		. . Potentiometer, (FOCUS) CLARASTAT/Equiv.	1
R-8	CM42299		. . Potentiometer, (IN-TENSITY) CLAROSTAT/ Equiv.	1
Dwg. Ref. 4-23-0612		1-23-0625	. Scope Main Board Assy.	REF
		2-23-0604	. . Scope Main P.C. Bd.	1
X1 & 9	SN72741		. . IC, TI/Equiv.	2
X2, 4 & 7	CA3130T		. . IC, RCA/Equiv.	3
X3, 5, & 8	CD4066		. . IC, RCA/Equiv.	3
X6	SN72709		. . IC, TI/Equiv.	1

Ref. Symbol	Part No.	IFR Stock No.	Description	Qty Per Assy
Dwg. Ref. 4-23-0612		1-23-0625	. Scope Main Board Assy.	REF
Q1	2N2905		. . Transistor, RCA/Equiv.	1
Q2, 6, 12, & 18	2N2222		. . Transistor, MOTOROLA/ Equiv.	4
Q4, 5, 16, & 17	40321		. . Transistor, RCA/Equiv.	4
Q7, 8, 9, 14, & 15	2N3251		. . Transistor, NATIONAL/ Equiv.	5
Q10 & 11	2N3646		. . Transistor, GE/Equiv.	2
Q13	2N2405		. . Transistor, MOTOROLA/ Equiv.	1
CR1	LM329CZ		. . Zener Diode, NATIONAL/ Equiv.	1
CR2, 3 & 8 thru 12	1N4148		. . Diode, DICKSON/Equiv.	7
CR4	1N5231		. . Diode, DICKSON/Equiv.	1
CR13	1N5229		. . Diode, DICKSON/Equiv.	1
R-6	62-2-1-202		. . Trim Pot., SPECTROL/ Equiv.	1
R-8	62-2-1-201		. . Trim Pot., SPECTROL/ Equiv.	1
R-40,61	62-2-1-502		. . Trim Pot., SPECTROL/ Equiv.	1
R-58	62-2-1-103		. . Trim Pot., SPECTROL/ Equiv.	1
R-67	62-2-1-102		. . Trim Pot., SPECTROL/ Equiv.	1
C2	DV11PS35D		. . Trim Cap., ELMENCO/ Equiv.	1

7.10 Coaxial Cables

Dwg. Ref 4-23-0474 Cable Number	Cable Connections	IFR Stock No.
1	RF Attenuator to 2nd Mixer & Diode Sw. Assy.	1-23-0237-1
2	120 MHz receiver to 250 kHz IF,Mon., Audio Bd.	1-23-0237-2
3	AM-FM Generator to RF Attenuator	1-23-0237-3
4	AM-FM Generator to 2nd Mixer & Diode Sw. Assy.	1-23-0237-4
5	Clock Divider to AM-FM Generator	1-23-0237-5
6	10 MHz Oven & Oscillator to Clock Divider	1-23-0237-6
7	2nd Mixer & Diode Sw. Assy to 120 MHz Receiver	1-23-0237-7
8	10 MHz Oven & Oscillator to 10 MHz Out Jack (J-103)	1-23-0237-8
9	1080 MHz Mult. Amp. to 2nd Mixer & Diode Sw. Assy.	1-23-0237-9
10	108 MHz Filter to 1080 MHz Mult. Amp	1-23-0237-10
11	10 MHz Oven & Oscillator to 100 MHz Mult. 108 MHz Mixer.	1-23-0237-11
12	10 MHz Oven & Oscillator to 2nd Mixer & Diode Sw. Assy.	1-23-0237-12
13	Diode Protect & 1st Mixer to Change Over Relay	1-23-0237-13
14	1st Mixer to 1200 MHz Filter & T.R. Switch	1-23-0237-14
15	1200 MHz Filter & T.R. Switch to 2nd Mixer & Diode Sw. Assy	1-23-0237-15
16	1200 MHz Filter & T.R. Switch to 1200 MHz Amp.	1-23-0237-16
17	1200 MHz Filter & T.R. Switch to 1200 MHz Amp.	1-23-0237-17
18	VCO PWR Divider to 1st Mixer	1-23-0237-18

Dwg. Ref 4-23-0474 Cable Number	Cable Connections	IFR Stock No.
19	VCO Tuner to Tune Summation	1-23-0237-19
20	VCO Tuner to Tune Summation	1-23-0237-20
21	VCO PWR Divider to High Freq. Mult. Mixer	1-23-0237-21
22	High Freq. Mult. Mixer to Het Amp ÷ 2 Prescaler	1-23-0237-22
23	100 MHz Filter Amp to High Freq. Mult. Mixer	1-23-0237-23
24	Het Amp ÷ 2 Prescaler to HF Ø Lock Loop	1-23-0237-24
25	HF Ø Lock Loop to VCO tuner	1-23-0237-25
26	79-80 MHz Ø Lock Loop to 100 MHz Mult. 108 Mixer	1-23-0237-26
27	Antenna Jack (J-27) to Static Protect Block	1-23-0237-27
28	100 MHz Mult. 108 MHz Mixer to 100 MHz Filter Amp.	1-23-0237-28
29	Change over Relay to 20 dB pad	1-23-0237-29
30	100 MHz Mult. 108 MHz Mxr. to 108 MHz Filter	1-23-0237-30
31	Static Protect Block to Change over Relay	1-23-0237-31
32	2nd Mixer & Diode Sw. Assy to HF Ø Lock Loop	1-23-0237-32
33	Oscilloscope input to J-108 (front panel)	1-23-0237-33
34	AGC System Assy. to Tune Summation	1-23-0237-34
Semi-Rigid Coax.	TRANS-RCVR Jack (J-102) to 20dB pad	3-23-0308

7.11 Case Assy 1-23-0429

Dwg. 4-23-0474 Ref. Symbol	Part No.	IFR. Stock No.	Description	Qty Per Assy
		1-23-0429	Case Assy.	REF
		3-76-0164-1	. Case, Modified	1
	MP-40008-3		. . Wire Bail & (4) Mounting Feet Kit	1
		3-76-0164-2	. Case Cover, Modified	1
			. . Clip on Receptacle, SOUTHCO	2
	006-PL		. . Handle w/mtg screws, Phila. Handle Co.	1
		2-23-0420	. . Accessor Storage Cover	1
	85-12-160-16		. . ¼ Turn Fastner, SOUTHCO	2
	85-34-101-17		. . ¼ Turn Fastner Split Ring Retainer	2
	UG-306/U		. . 90° BNC Adapter, Male to Female	1
	MLD-1.25		. . Fuse, 1.25 Amp. Buss Slo-Blo	1
	AGC-7½		. . Fuse, 7½ Amp. Buss	2
		1-76-0165	. . Antenna	1
		2-23-0266-1	. . Ext. DC Power Cable	1
		2-23-0266-2	. . AC Power Cable	1

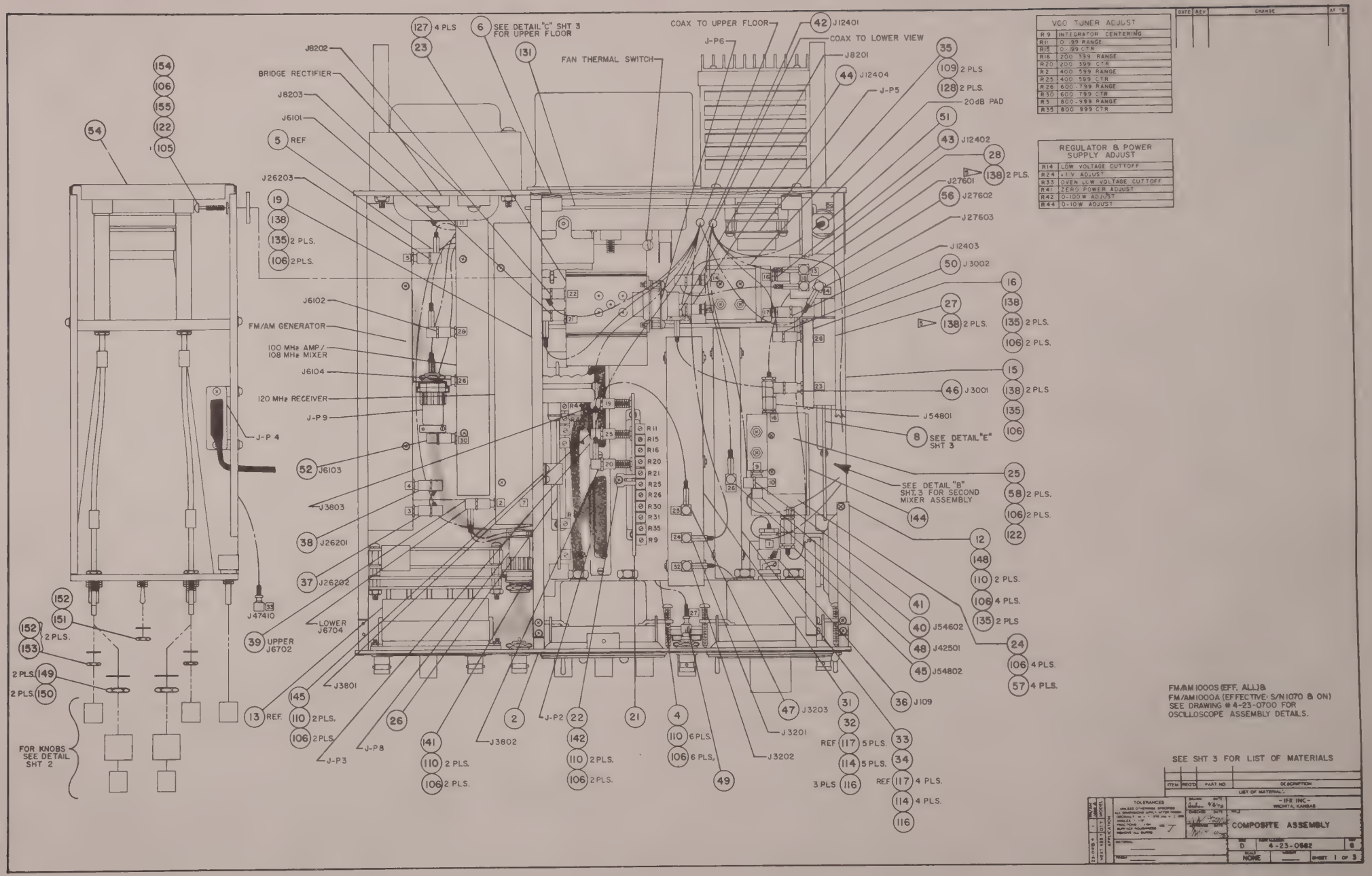
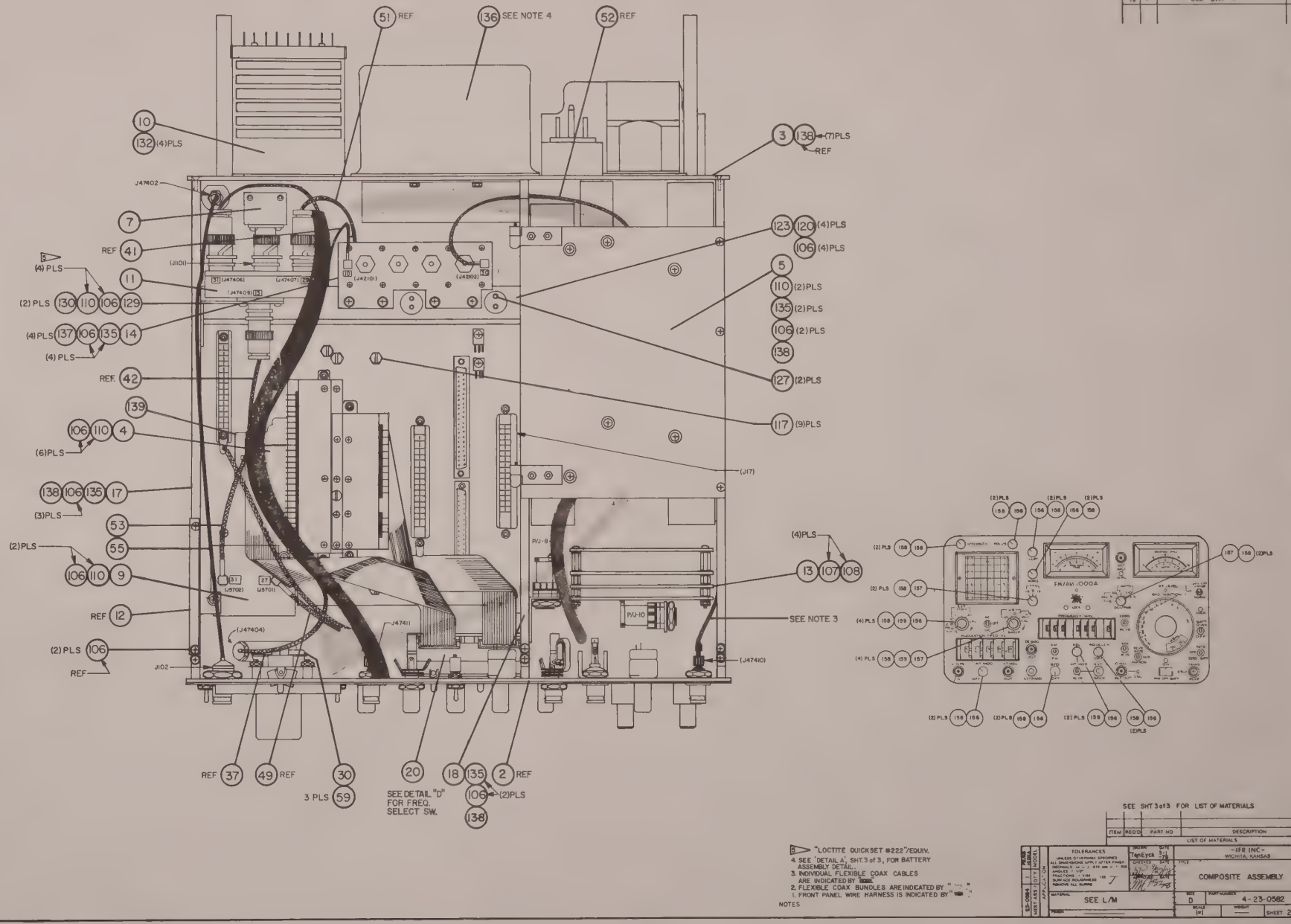

VCO TUNER ADJUST
R9 INTEGRATOR CENTERING
R11 0-99 RANGE
R15 0-199 CTR
R16 200-399 RANGE
R20 200-399 CTR
R21 400-599 RANGE
R25 400-599 CTR
R26 600-799 RANGE
R30 600-799 CTR
R31 800-999 RANGE
R35 800-999 CTR
REGULATOR & POWER SUPPLY ADJUST
R14 LOW VOLTAGE CUTTOFF
R24 +11V ADJUST
R33 OVEN LOW VOLTAGE CUTTOFF
R41 ZERO POWER ADJUST
R42 0-100W ADJUST
R44 0-10W ADJUST
J8202
BRIDGE RECTIFIER
J8203
J6101
J26203
J6102
FM/AM GENERATOR
100 MHz AMP/ 108 MHz MIXER
J6104
120 MHz RECEIVER
J-P9
J-P4
J6103
J3803
J26201
J26202
J47410
LOWER J6704
UPPER J6702
J3801
J-P3
J-P8
J3802
J-P2
J3201
J3202
J3203
J109
J54802
J42501
J54602
J3001
J54801
J3002
J12403
J27603
J27602
J27601
J12402
J12404
J8201
J-P5
J-P6
J12401
COAX TO UPPER FLOOR
COAX TO LOWER VIEW
FAN THERMAL SWITCH
20dB PAD
SEE DETAIL "C" SHT 3 FOR UPPER FLOOR
SEE DETAIL "E" SHT 3
SEE DETAIL "B" SHT. 3 FOR SECOND MIXER ASSEMBLY
FOR KNOBS SEE DETAIL SHT 2
FM/AM 1000S (EFF. ALL)&
FM/AM 1000A (EFFECTIVE: S/N 1070 & ON)
SEE DRAWING # 4-23-0700 FOR OSCILLOSCOPE ASSEMBLY DETAILS.
SEE SHT 3 FOR LIST OF MATERIALS
– IFR INC –
WICHITA, KANSAS
COMPOSITE ASSEMBLY
4-23-0682
SHEET 1 OF 3

Figure 6-1-1



DATE	REV.	CHANGE	APP'D
5-1-78	F	SEE SHT 1	

SEE SHT 3 of 3 FOR LIST OF MATERIALS

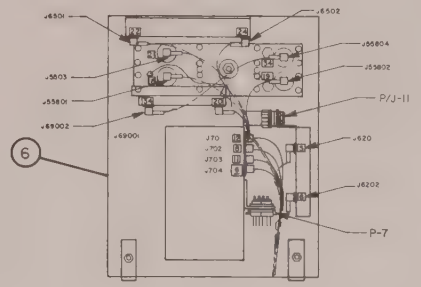
ITEM	REQD	PART NO	DESCRIPTION
			LIST OF MATERIALS

5. "LOCTITE QUICKSET #222"/EQUIV.
4. SEE 'DETAIL A', SHT. 3 of 3, FOR BATTERY ASSEMBLY DETAIL.
3. INDIVIDUAL FLEXIBLE COAX CABLES ARE INDICATED BY [illegible].
2. FLEXIBLE COAX BUNDLES ARE INDICATED BY "[illegible]".
1. FRONT PANEL WIRE HARNESS IS INDICATED BY "[illegible]".

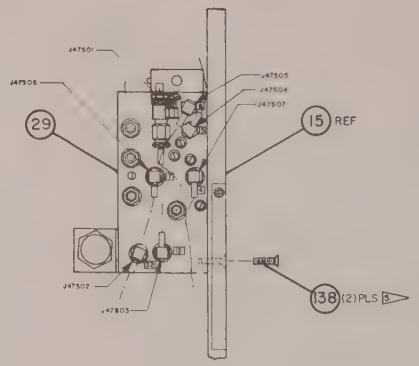
NOTES

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER PLATING DECIMALS .XX ± .010 .XXX ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 BURR ACID ROUGHNESS REMOVE ALL BURRS	DRAWN Tom Eyck 5-1-78	-IFR INC- WICHITA, KANSAS	
MATERIAL SEE L/M	FINISH	TITLE COMPOSITE ASSEMBLY	
		SIZE D	PART NUMBER 4-23-0582 REV F
		SCALE H	WEIGHT SHEET 2 OF 3

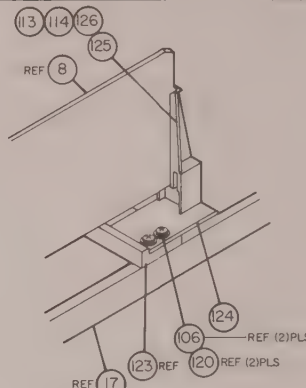
Figure 6-1-2



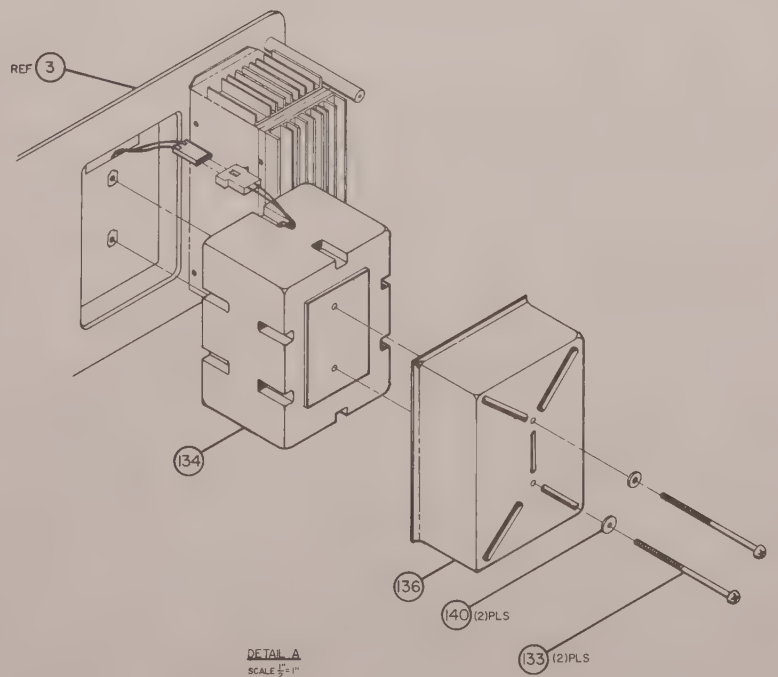
DETAIL C
SCALE 1" = 1"



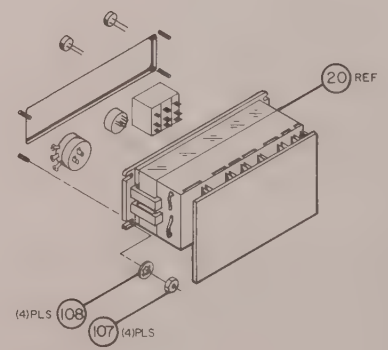
DETAIL B
SCALE 1" = 1"



DETAIL E
SCALE 1" = 1"



DETAIL A
SCALE 1" = 1"



DETAIL D
SCALE 3/4" = 1"
REAR VIEW OF ITEM 2 FRONT PANEL

ITEM	REQ'D	PART NO	DESCRIPTION
159	2	1-09-0220	KNOB "SWEEP,EXT."/DIV
158	28	82 56x1/8	SOCKET HEAD SET SCREW
157	3	1-09-0219-2	KNOB "KHz,DEV/PWR.
156	16	1-09-0218-1	KNOB
155	1	76-0002-19	WASHER
154	1	84-40	LARGE PATTERN HEX NUT
153	2	4-32	EXTRA SMALL PATTERN HEX NUT
152	3	76-0002-8	PANEL WASHER
151	1	4-40x40	EXTRA SMALL PATTERN HEX NUT
150	2	76-0002-5	"H.H SMITH"/EQUIV FLAT WASHER
149	2	3/8-32	EXTRA SMALL PATTERN HEX NUT
148	1	1-23-0579	RETAINER
147	1	A0337-01B	"AMPEREX"/EQUIV SPEAKER (REF)
146	1	2-23-0574	SPEAKER MOUNTING PLATE (REF)
145	1	2-23-0355	PC BD RETAINER
144	1	2-23-0276	1080 MHz MULTIPLIER AMPLIFIER MTG BRACKET
143	2	2-23-0566	INSULATOR
142	1	76-0001-63	STANDOFF
141	1	1-23-0409	CONNECTOR MOUNTING BRACKET
140	2	ANSI60-010L	FLAT WASHER
139	1	ABMS-AS	"PANDUIT"/EQUIV CABLE TIE MOUNT
138	13	84-40x3/8	PPHMS
137	4	76-0001-61	SPACER
136	1	1-23-0075	BATTERY COVER
135	18	84-40x1/2	PBHMS
134	1	1-78-0245	MODIFIED "GATES"/EQUIV 0800-0008 BATTERY
133	2	1-78-0173	MODIFIED ROUND HEAD BOLT @10-32 x 3 3/4 LG.
132	4	86-32x1/4	PBHMS
131	1	1-23-0171	HINGE ROD
130	2	84 40x7/16	PFHMS
129	1	2-23-0444	CHANGEOVER RELAY MOUNTING BRACKET
128	2	2-76-0004 #6	STANDOFF
127	4	84-40x1/2	SOCKET HEAD CAP SCREW
126	1	86-32x5/8	PBHMS
125	1	67782-1	"AMP"/EQUIV PC CARD GUIDE
124	1	1-23-0339	MOUNTING PLATE, PC CARD GUIDE
123	1	2-23-0290	MTG. BRKT., 1200 MHz FILTER, HIGH FREQ. MULT. MOD.
122	1	AND960-C4	WASHER 5/16 OD
121	12	86-3-3	"STAMPSON"/EQUIV RIVET
120	4	84-40x3/8	PBHMS
119	2	1-23-0528	GROUNDING STRIP (REF)
118	2	2-23-0511	INSULATOR (REF)
117	9	1-78-0174	HEX NUT
116	4	#10	INTERNAL TOOTH LOCKWASHER
115	4	#10-32	EXTRA SMALL PATTERN HEX NUT (REF)
114	10	#8	INTERNAL TOOTH LOCKWASHER
113	1	86-32	HEX NUT SMALL PATTERN
112	9	MS90479A4-8	RIVET 1/8 DIA. x 1/8 LONG (REF)
111	9	1500	"H.H SMITH"/EQUIV #6-32 SPADE LUG (REF)
110	28	84-40x1/4	PBHMS
109	2	84-40x3/4	SOCKET HEAD CAP SCREW
108	8	#2	INTERNAL TOOTH LOCKWASHER
107	8	82-56	LARGE PATTERN HEX NUT
106	57	#4	INTERNAL TOOTH LOCKWASHER
105	1	1-78-0328	CAPTIVE SCREW

ITEM	REQ'D	PART NO	DESCRIPTION
59	1	82 [illegible]	PFHMS
58	2	84-4 x 5/16	PBHMS
57	4	84-4 x 5/16	PBHMS
56	1	23-0237-14	FLEXIBLE COAX CABLE ASSEMBLY
55	1	1-23-0457	SEMI-RIGID COAX ASSEMBLY
54	1	23-0294	SCOPE ASSEMBLY
53		23-0237-31	
52	1	23-0237-30	
51		23-0237-29	
50	1	23-0237-28	
49		23-0237-27	
48	1	23-0237-26	
47	1	23-0237-25	
46	1	23-0237-23	
45		23-0237-17	
44		23-0237-15	
43		23-0237-16	
42		23-0237-13	
41	1	23-0237-10	
40	1	23-0237-9	
39		23-0237-7	
38		23-0237-4	
37	1	23-0237-3	
36		3-23-0237-1	FLEXIBLE COAX CABLE ASSEMBLIES
35	1	1-23-0297	200MHz FILTER/DIODE SWITCH ASS'Y
34	1	3-23-0442	79 80MHz OSC @ LOCK LOOP PC BD.ENCLOSURE
33	1	1-23-0424	79 80MHz OSC @ LOCK LOOP PC BOARD ASS'Y
32		3-23-0485	HIGH FREQUENCY @ LOCK PC BOARD ENCLOSURE
31	1	1-23-0485	HIGH FREQUENCY @ LOCK PC BOARD ASSEMBLY
30		1-23-0534	ATTENUATOR KIT
29	1	4-23-0482	SECOND MIXER ASSEMBLY
28	1	1-23-0850	FIRST MIXER ASSEMBLY
27	1	1-23-0883	100MHz FILTER ASSEMBLY
26	1	1-23-0081	REGULATOR AND POWER SUPPLY PC BD ASS'Y
25	1	1-23-0516	1080MHz MULTIPLIER AMPLIFIER ASSEMBLY
24	1	1-23-0864	1200 MHz AMPLIFIER ASSEMBLY
23	1	3-23-0097	HIGH FREQ MULTIPLIER MIXER ASSEMBLY
22	1	1-23-0426	VCO TUNER PC BOARD RETAINER
21	1	1-23-0423	VCO TUNER PC BOARD ASSEMBLY
20	1	1-23-0433	[illegible] SWITCH ASS'Y
19	1	2-23-0166	
18	1	2-23-0163	
17	1	2-23-0165	
16	1	2-23-0164	
15	1	2-23-0167	FRAME SUPPORT MEMBER
14	1	2-23-0402	108MHz BANDPASS FILTER ASSEMBLY
13	1	1-23-0188	TONE GENERATOR ASSEMBLY
12	1	2-23-0234	SPEAKER ASSEMBLY
11	1	1-78-0190	RELAY
10	1	4-23-0364	DUTY CYCLE REGULATOR ASSEMBLY
9	1	1-23-0469	STATIC DISCHARGE PROTECTOR ASSEMBLY
8	1	1-23-0873	250KHz IF MONITOR AUDIO PC BD. ASSEMBLY
7	1	1-23-0228	POWER MONITOR ASSEMBLY
6	1	1-23-0216	UPPER FLOOR ASSEMBLY
5	1	1-23-0490	LOWER FLOOR ASSEMBLY
4	1	3-23-0518	MOTHER BOARD ASSEMBLY
3	1	1-23-0380	REAR PANEL ASSEMBLY
2	1	3-23-0678	FRONT PANEL ASSEMBLY
1	1	4-23-0582	COMPOSITE ASSEMBLY

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS X = ± .1 XX = ± .03 XXX = ± .010
ANGLES ± 1°
SURFACE ROUGHNESS 125 MICRO INCHES
REMOVE ALL BURRS

Tim Eyck 2-22-78
CHECKED
APPROVED

- IFR INC -
WICHITA, KANSAS

COMPOSITE ASSEMBLY

4-23-0582 F

MATERIAL SEE L/M

FINISH

DO NOT SCALE DRAWING

AS NOTED

SHEET 3 OF 3

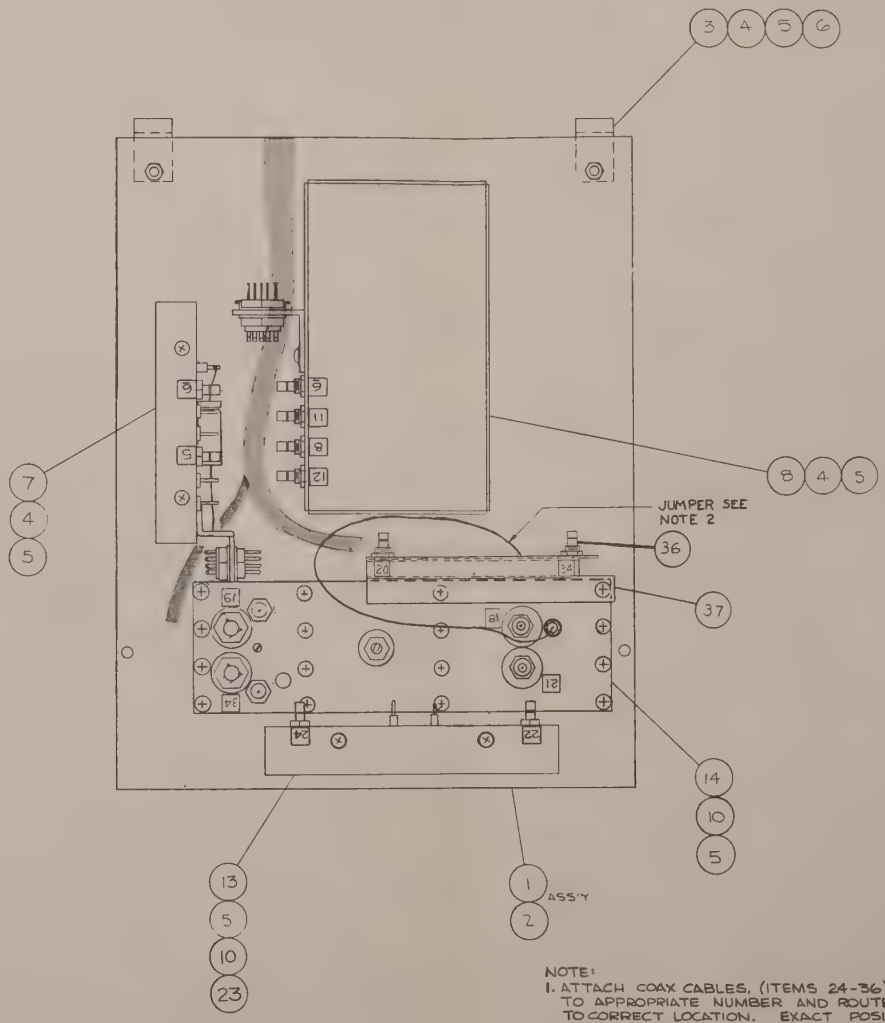
4-23-0582 REV. D NEXT ASSY

APPLICATION

USED ON MODEL

QTY

Figure 6-1-3



DATE	REV	CHANGE	APPD
7/9/74	A	INCORPORATED ECN #1	
7/19/74	B	INCORPORATED ECN SER. C.I.D.	
8/6/74	C	INCORPORATED ECN # 254	
9/5/74	D	INCORPORATED ECN # 3	
9/27/74	E	INCORP ECN # 388	
10/4/74	F	INC ECN # 1669 RKK	
1/7/75	G	INC ECN # 1873	

ITEM	REQ'D	PART NO.	DESCRIPTION
37	1	23-0694	AGC PC BD MTG BRKT
36	1	23-0696	AGC PC BD ASSY
35	1	5-28-0237-24	
34	1	5-28-0237-22	
33	1	5-28-0237-21	
32	1	5-28-0237-20	
31	1	5-28-0237-19	
30	1	5-28-0237-18	
29	1	5-28-0237-12	
28	1	5-28-0237-11	
26	1	5-28-0237-8	
25	1	5-28-0237-6	
24	1	5-28-0237-5	RF CABLE
23	2	2-70-2001-41	SPACER
14	1	23-0560	1200-2200 MHz OSC ASSY
13	1	23-0225	÷2 PRESCALER ASS'Y
10	6	#4-40X3/8	PHIL SCREW, BIND HEAD
8	1	23-0218	10 MHz OVEN OSC. ASS'Y
7	1	23-0217	CLOCK DIVIDER ASS'Y
6	2	#4-40	LARGE PATTERN HEX NUT
5	14	#4	INT. TOOTH LOCKWASHER
4	8	#4-40X1/4	PHIL. SCREW, BIND HEAD
3	2	23-0170	UPPER FLOOR HINGE
2	1	23-0608	UPPER FLOOR
1	1	23-0216	UPPER FLOOR ASS'Y

NOTE:
1. ATTACH COAX CABLES, (ITEMS 24-36) TO APPROPRIATE NUMBER AND ROUTE TO CORRECT LOCATION. EXACT POSITION OF CABLES NOT SHOWN.
2. ROUTE JUMPER WIRE AROUND PC BOARD AS SHOWN. (R/W #26AWG).

23-0216	1	FM/AM 1000
NEXT ASSY	QTY	MODEL

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN JNW 7/4/74
CHECKED [illegible] 8/23/74
APPROVED [illegible] 8/23/74

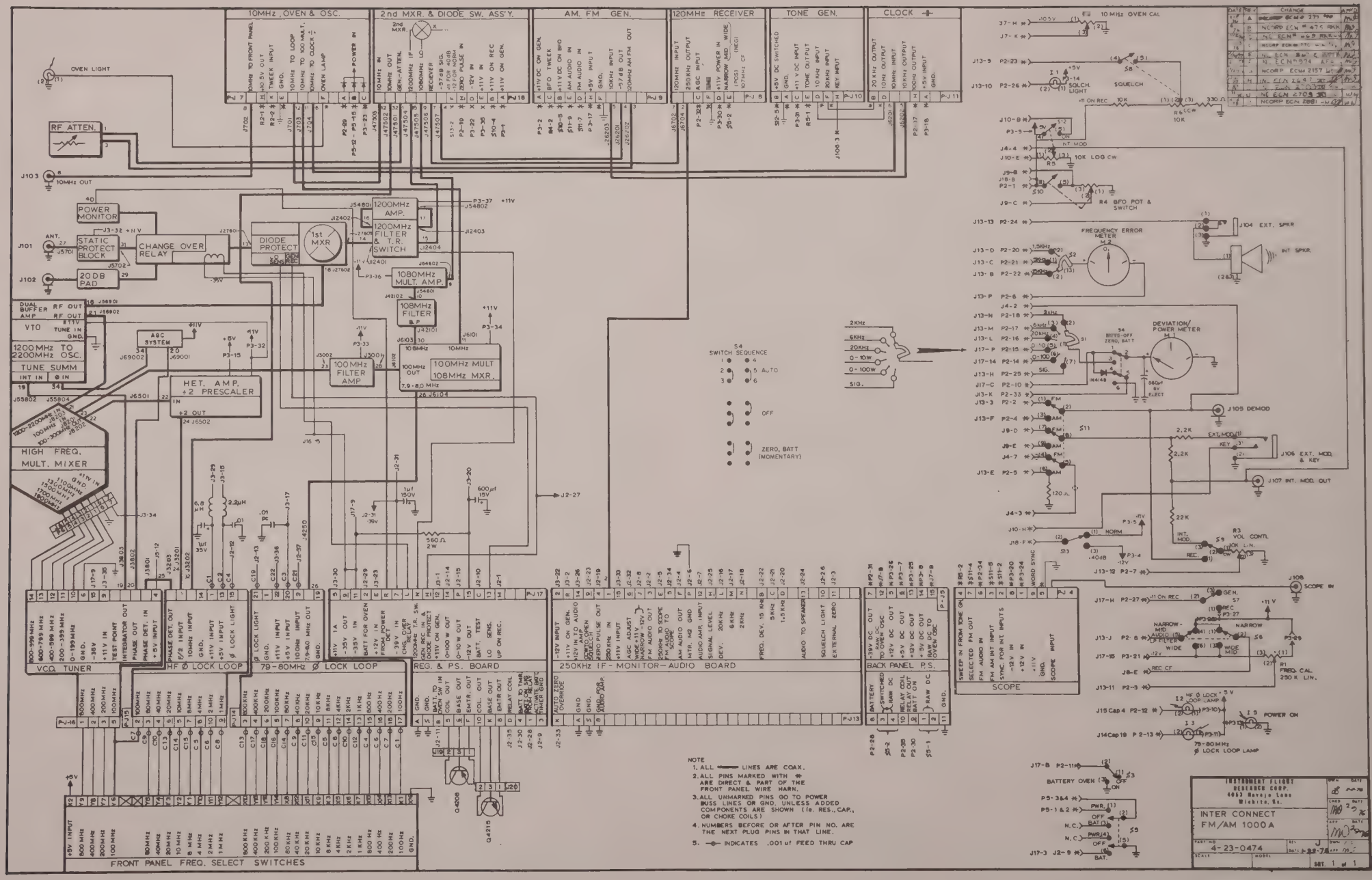
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

TITLE: UPPER FLOOR ASSEMBLY FM/AM 1000

MATERIAL: SEE ABOVE
TREATMENT
FINISH

SIZE: C | PART NUMBER: 5-23-0216 | REV: D
SCALE: 1/1 | WEIGHT | SHEET 1 OF 1

Figure 6-2



NOTE
1. ALL ═══ LINES ARE COAX.
2. ALL PINS MARKED WITH * ARE DIRECT & PART OF THE FRONT PANEL WIRE HARN.
3. ALL UNMARKED PINS GO TO POWER BUSS LINES OR GND. UNLESS ADDED COMPONENTS ARE SHOWN (ie. RES., CAP., OR CHOKE COILS)
4. NUMBERS BEFORE OR AFTER PIN NO. ARE THE NEXT PLUG PINS IN THAT LINE.
5. ─●─ INDICATES .001 uf FEED THRU CAP

Figure 6-3

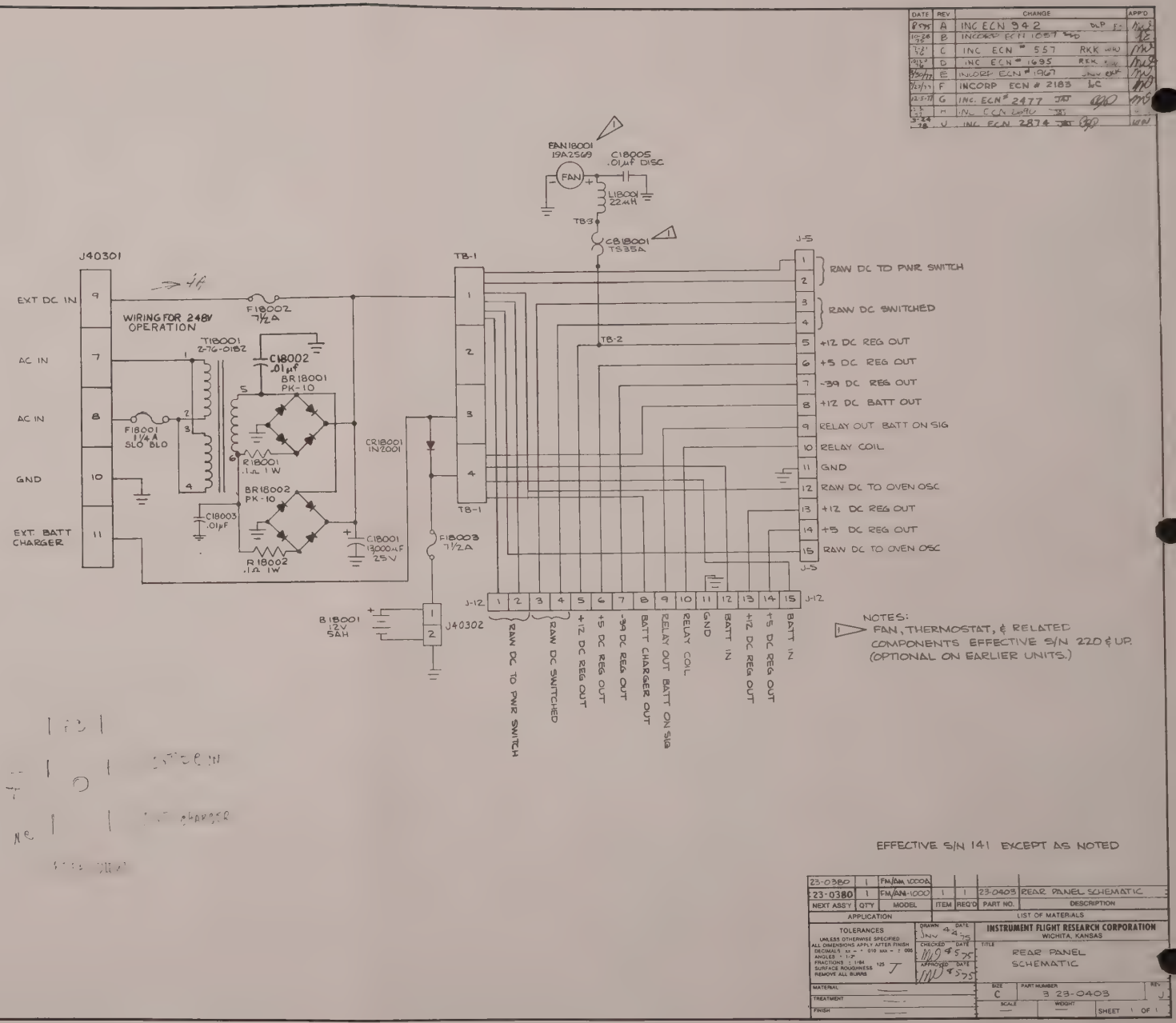

DATE REV CHANGE APP'D
A INC ECN 942
B INCORP ECN 1057
C INC ECN # 557 RKK
D INC ECN # 1695 RKK
E INCORP ECN # 1967
F INCORP ECN # 2183 LC
G INC. ECN # 2477 JAT
J INC ECN 2874
FAN18001 19A2569
C18005 .01µf DISC
FAN
L18001 22mH
TB3
CB18001 TS35A
J40301
EXT DC IN
AC IN
AC IN
GND
EXT. BATT CHARGER
WIRING FOR 24BV OPERATION
F18002 7½A
T18001 2-76-0182
C18002 .01µf
BR18001 PK-10
F18001 1¼A SLO BLO
R18001 .1Ω 1W
BR18002 PK-10
C18003 .01µF
R18002 .1Ω 1W
CR18001 1N2001
C18001 13000µF 25V
F18003 7½A
TB-1
TB-2
J-5
RAW DC TO PWR SWITCH
RAW DC SWITCHED
+12 DC REG OUT
+5 DC REG OUT
-39 DC REG OUT
+12 DC BATT OUT
RELAY OUT BATT ON SIG
RELAY COIL
GND
RAW DC TO OVEN OSC
+12 DC REG OUT
+5 DC REG OUT
RAW DC TO OVEN OSC
J-12
B18001 12V 5AH
J40302
NOTES:
1 FAN, THERMOSTAT, & RELATED COMPONENTS EFFECTIVE S/N 220 & UP. (OPTIONAL ON EARLIER UNITS.)
EFFECTIVE S/N 141 EXCEPT AS NOTED
23-0380 1 FM/AM-1000A
23-0380 1 FM/AN-1000 1 1 23-0403 REAR PANEL SCHEMATIC
NEXT ASSY QTY MODEL ITEM REQ'D PART NO. DESCRIPTION
APPLICATION LIST OF MATERIALS
TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS XX ± .010 XXX ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS REMOVE ALL BURRS 125
DRAWN JNV 4-2-75
CHECKED MD 4-5-75
APPROVED MD 4-5-75
INSTRUMENT FLIGHT RESEARCH CORPORATION WICHITA, KANSAS
TITLE REAR PANEL SCHEMATIC
MATERIAL
TREATMENT
FINISH
SIZE C PART NUMBER 3 23-0403 REV J
SCALE WEIGHT SHEET 1 OF 1

Figure 6-4

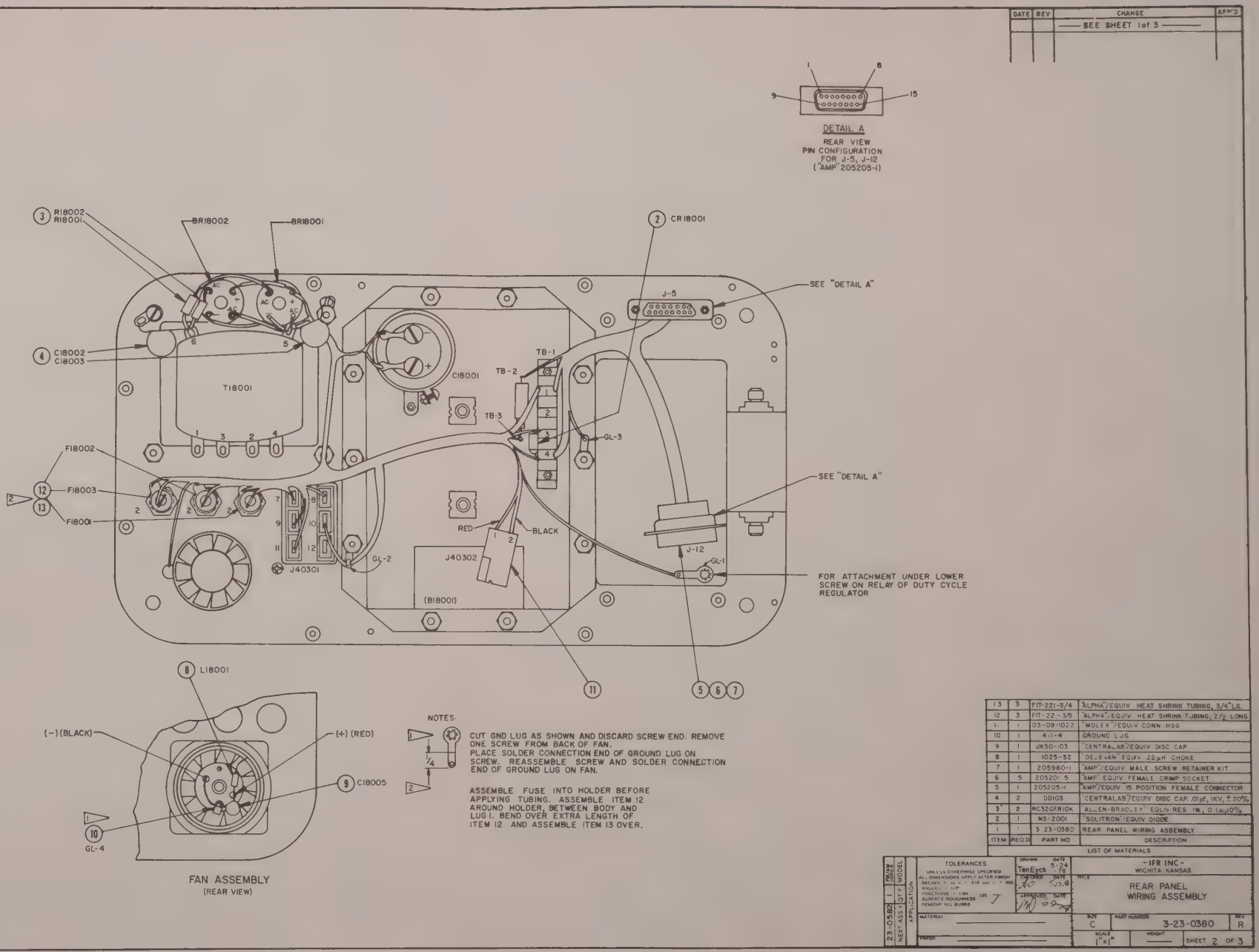
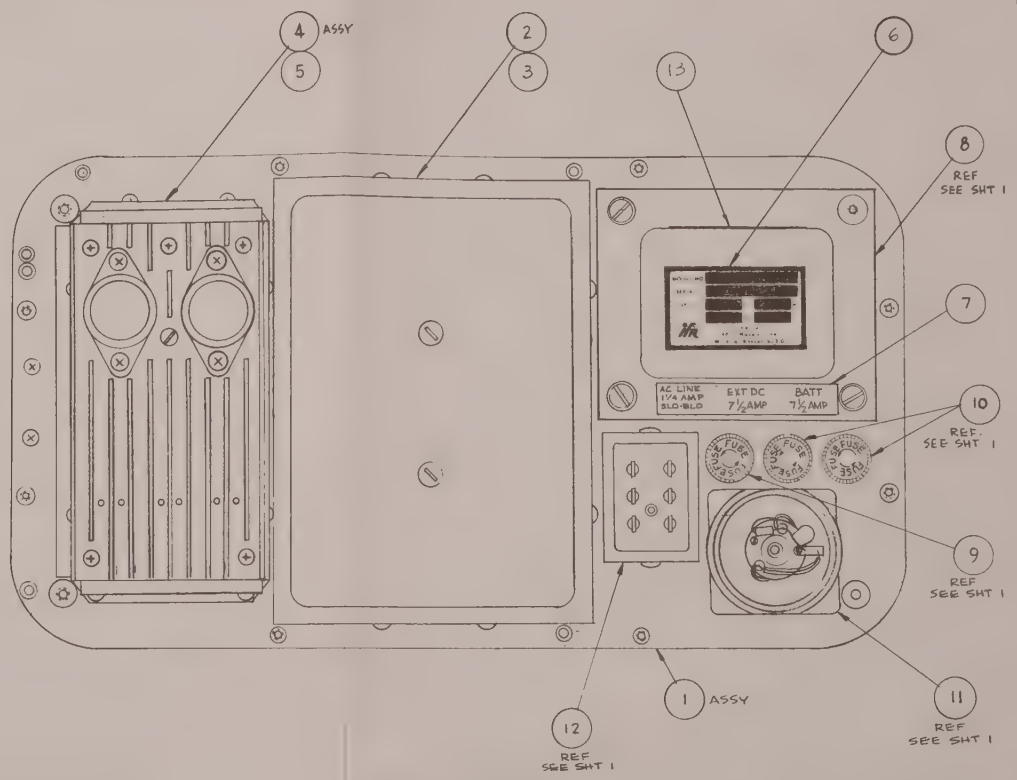

DATE | REV | CHANGE | APP'D
SEE SHEET 1 of 3
DETAIL A
REAR VIEW
PIN CONFIGURATION
FOR J-5, J-12
("AMP" 205205-1)
1
8
9
15
3 RI8002
RI8001
BRI8002
BRI8001
2 CRI8001
SEE "DETAIL A"
J-5
4 CI8002
CI8003
CI8001
TB-1
TB-2
TB-3
T18001
GL-3
FI8002
12 FI8003
2
13 FI8001
SEE "DETAIL A"
RED
BLACK
J40302
J-12
GL-1
GL-2
J40301
(BI8001)
FOR ATTACHMENT UNDER LOWER SCREW ON RELAY OF DUTY CYCLE REGULATOR
11
5 6 7
8 LI8001
(-) (BLACK)
(+) (RED)
9 CI8005
10
GL-4
FAN ASSEMBLY
(REAR VIEW)
NOTES:
1
1/4
2
CUT GND LUG AS SHOWN AND DISCARD SCREW END. REMOVE ONE SCREW FROM BACK OF FAN. PLACE SOLDER CONNECTION END OF GROUND LUG ON SCREW. REASSEMBLE SCREW AND SOLDER CONNECTION END OF GROUND LUG ON FAN.
ASSEMBLE FUSE INTO HOLDER BEFORE APPLYING TUBING. ASSEMBLE ITEM 12 AROUND HOLDER, BETWEEN BODY AND LUG 1. BEND OVER EXTRA LENGTH OF ITEM 12 AND ASSEMBLE ITEM 13 OVER.
13 | 3 | FIT-221-3/4 | "ALPHA"/EQUIV HEAT SHRINK TUBING, 3/4" LG.
12 | 3 | FIT-22-3/8 | "ALPHA"/EQUIV HEAT SHRINK TUBING, 2 1/2 LONG
11 | 1 | 03-09-1022 | "MOLEX"/EQUIV CONN HSG
10 | 1 | 4-11-4 | GROUND LUG
9 | 1 | UK50-103 | "CENTRALAB"/EQUIV DISC CAP
8 | 1 | 1025-52 | "DELEVAN" EQUIV 22 µH CHOKE
7 | 1 | 205980-1 | "AMP"/EQUIV MALE SCREW RETAINER KIT
6 | 5 | 205201-5 | "AMP" EQUIV FEMALE CRIMP SOCKET
5 | 1 | 205205-1 | "AMP"/EQUIV 15 POSITION FEMALE CONNECTOR
4 | 2 | DD103 | "CENTRALAB"/EQUIV DISC CAP .01 µf, 1KV, +20%
3 | 2 | RC32GF103K | "ALLEN-BRADLEY" EQUIV RES 1W, 0 1Ω ±10%
2 | 1 | NS-2001 | "SOLITRON"/EQUIV DIODE
1 | 1 | 3 23-0380 | REAR PANEL WIRING ASSEMBLY
ITEM | REQ'D | PART NO | DESCRIPTION
LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX ± .010 .XXX ± .005
ANGLES ± 1/2°
FRACTIONS 1/64
SURFACE ROUGHNESS
REMOVE ALL BURRS
125
DRAWN Ten Eyck 5-24-78
CHECKED DATE
APPROVED DATE
MATERIAL
FINISH
- IFR INC -
WICHITA KANSAS
TITLE
REAR PANEL
WIRING ASSEMBLY
SIZE C
PART NUMBER 3-23-0380
REV R
SCALE 1"=1"
WEIGHT
SHEET 2 OF 3
PANEL
MODEL
QTY 1
ASSY 23-0582
NEXT APPLICATION

Figure 6-5



DATE	REV	CHANGE	APP'D
	-	SEE SHT 1 OF 3	

ITEM	REQ'D	PART NO	DESCRIPTION
13	1	75-0023	FCC REGULATION TAG
12	1	7244-AB	"CINCH"/EQUIV MALE AC PLUG
11	1	00-0154	FAN HOUSING
10	2	AGC-7½	"BUSS"/EQUIV FUSE, 7½A SLO BLO
9	1	MDL-1.25	"BUSS"/EQUIV FUSE, 1¼A SLO BLO
8	1	76-0182	"NATIONAL"/EQUIV KFMR
7	1	23-0385	FUSE LABEL
6	1	75-0022	SERIAL Nº TAG
5	4	#6-32x⅜	PBHMS
4	1	23-0384	DUTY CYCLE REG ASSY
3	2	76-0173	MOD. ROUND HEAD BOLT
2	1	23-0076	BATTERY CASE COVER
1	1	23-0380	REAR PANEL ASSY

LIST OF MATERIALS

NEXT ASSY	QTY	MODEL
23-0380	1	FM/AM 1000A

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

	DRAWN	DATE
	SIMMONS	12-17-75
CHECKED	SSD	12-22-75
APPROVED		12/31/75

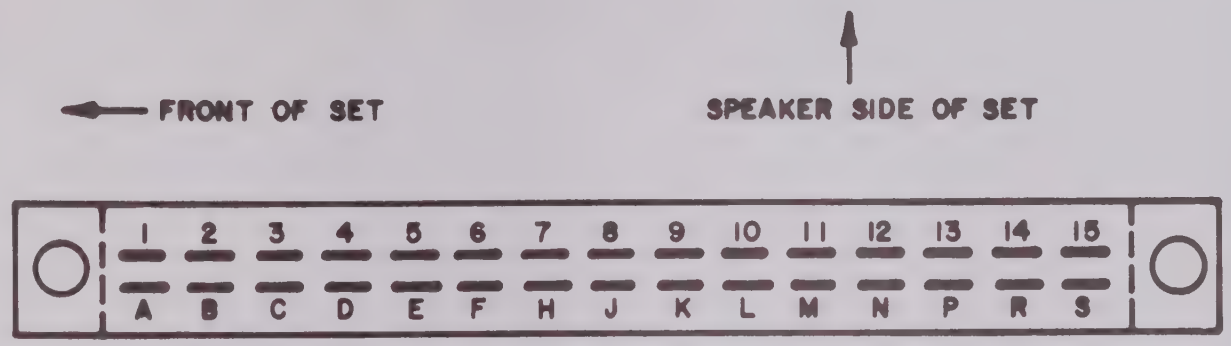
MATERIAL SEE LIST OF MATERIALS
TREATMENT —
FINISH —

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
REAR PANEL ASSEMBLY
VIEWED FROM OUTSIDE
FM/AM-1000A

SIZE C | PART NUMBER 3-23-0380 | REV R
SCALE FULL | WEIGHT — | SHEET 3 OF 3

Figure 6-6



CARD EDGE CONNECTOR PIN LAYOUT, AS VIEWED FROM BOTTOM OF SET, FOR:

FM/AM 1000 REGULATOR & POWER SUPPLY BOARD

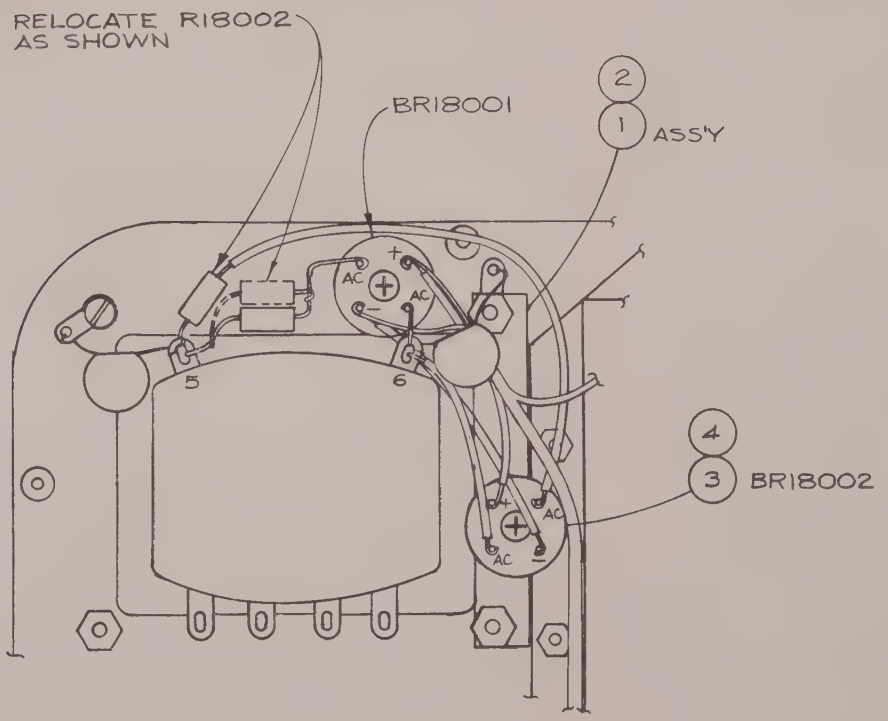
FM/AM 1000 100kHz – IF – MONITOR AUDIO BOARD

FM/AM 1000A REGULATOR & POWER SUPPLY BOARD (J-17)

FM/AM 1000A 250kHz – IF – MONITOR AUDIO BOARD (J-13)

Figure 6-7

DATE	REV	CHANGE	APP'D



			4	1	#6-32x3/16	PBHMS
			3	1	PK-10	"ELECTRONIC DEVICES"/EQUIV BRIDGE RECTIFIER
			2	1	23-0663	HEATSINK
23-0664	1	FM-AM1000A/S	1	1	23-0664	PWR SUPPLY MOD
NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION

APPLICATION | LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN WW 7/20/77
CHECKED 7/21/77
APPROVED 7/21/77

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE: POWER SUPPLY MODIFICATION

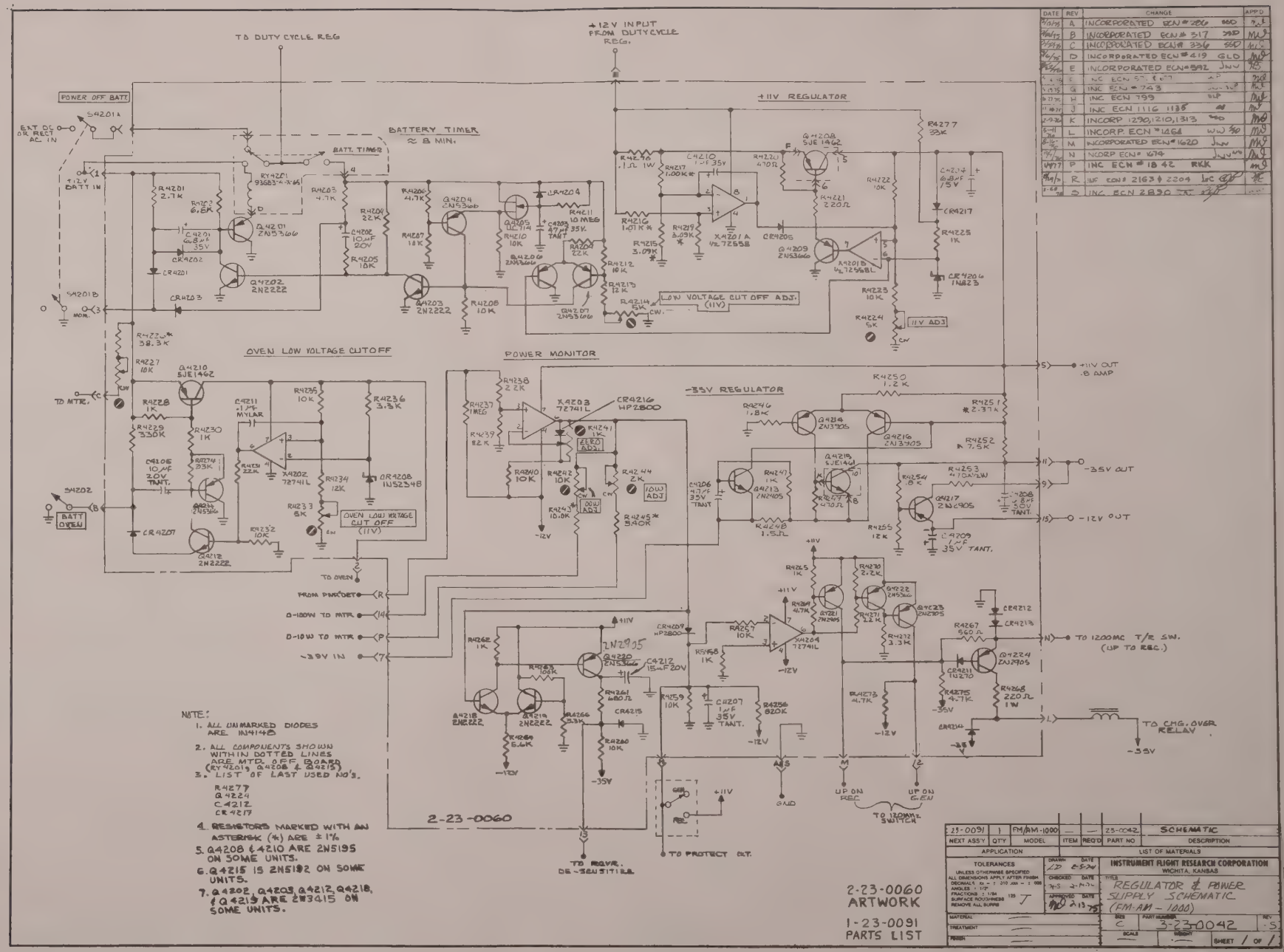
MATERIAL —
TREATMENT —
FINISH —

SIZE B | PART NUMBER 2-23-0664 | REV
SCALE 1:1 | WEIGHT — | SHEET 1 OF 1

2. ON BR18002, WIRE ALL DC TERMINALS AND ONE AC TERMINAL IN PARALLEL WITH BR18001. REMAINING AC TERMINAL TO BE WIRED THRU R18002 AS SHOWN.
1. SLEEVE ALL LEADS

NOTES:

Figure 6-8



DATE	REV	CHANGE	APP'D
9/5/73	A	INCORPORATED ECN # 286	BSD
10/4/73	B	INCORPORATED ECN # 317	BSD
10/31/73	C	INCORPORATED ECN # 336	BSD
12/6/73	D	INCORPORATED ECN # 419	GLD
2/25/74	E	INCORPORATED ECN # 592	JNW
3-4-75	F	INC ECN 577 & 587	AP
3-19-75	G	INC ECN # 743	JNW
10-27-75	H	INC ECN 799	BJP
11-10-76	J	INC ECN 1116 1138	
2-9-76	K	INCORP 1290, 1210, 1313	BSD
5-11-76	L	INCORP. ECN # 1464	WW
8-16-76	M	INCORPORATED ECN # 1620	JNW
10/1/76	N	INCORP ECN # 1674	JNW
4/4/77	P	INC. ECN # 1842	RKK
8/1/78	R	INC ECN 2163 & 2204	LC
1-6-82	S	INC. ECN 2830	JAT

1-23-0091	1	FM/AM-1000	—	—	2-23-0042	SCHEMATIC
NEXT ASSY	QTY	MODEL	ITEM	REQ'D	PART NO	DESCRIPTION

APPLICATION — LIST OF MATERIALS

TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DECIMALS X = ± .010 .XX = ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS REMOVE ALL BURRS 125

DRAWN LD 8-5-74 | CHECKED 7-5 2-20-74 | APPROVED 2-13-75

INSTRUMENT FLIGHT RESEARCH CORPORATION WICHITA, KANSAS

TITLE: REGULATOR & POWER SUPPLY SCHEMATIC (FM-AM-1000)

MATERIAL — TREATMENT — FINISH

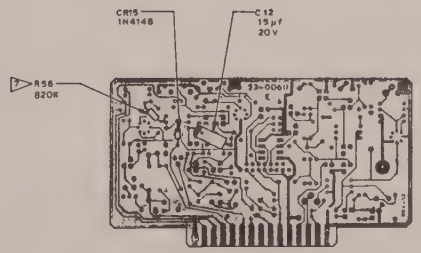
SIZE C | PART NUMBER 2-23-0042 | REV. S | SCALE — | WEIGHT — | SHEET 1 OF 1

Figure 6-9

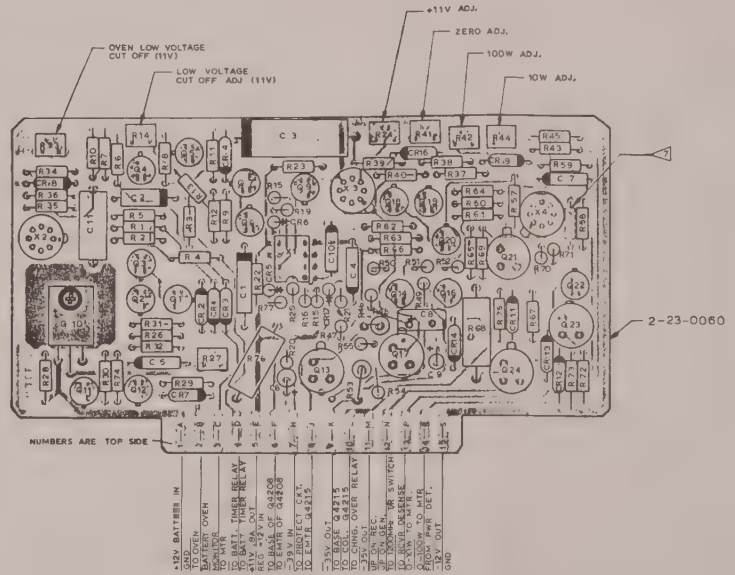
NOTES:

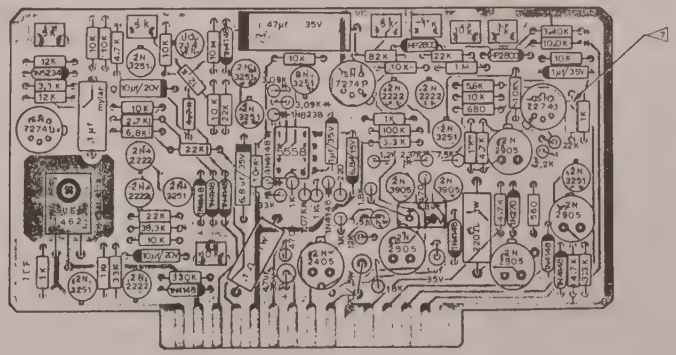
1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN μF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.
5.
6. * NOTES 1%, 1/4W RES.

▽ R56 IS MTD ON BACK SIDE AS SHOWN IN BOTTOM VIEW ONLY ON "E" REV. ARTWORK. FOR "F" REV IT WILL LOCATE AS IN THE LARGER VIEWS.



BOTTOM VIEW





PART LIST No. 1-23-0091
SCHEMATIC No. 3-23-0042

Figure 6-10

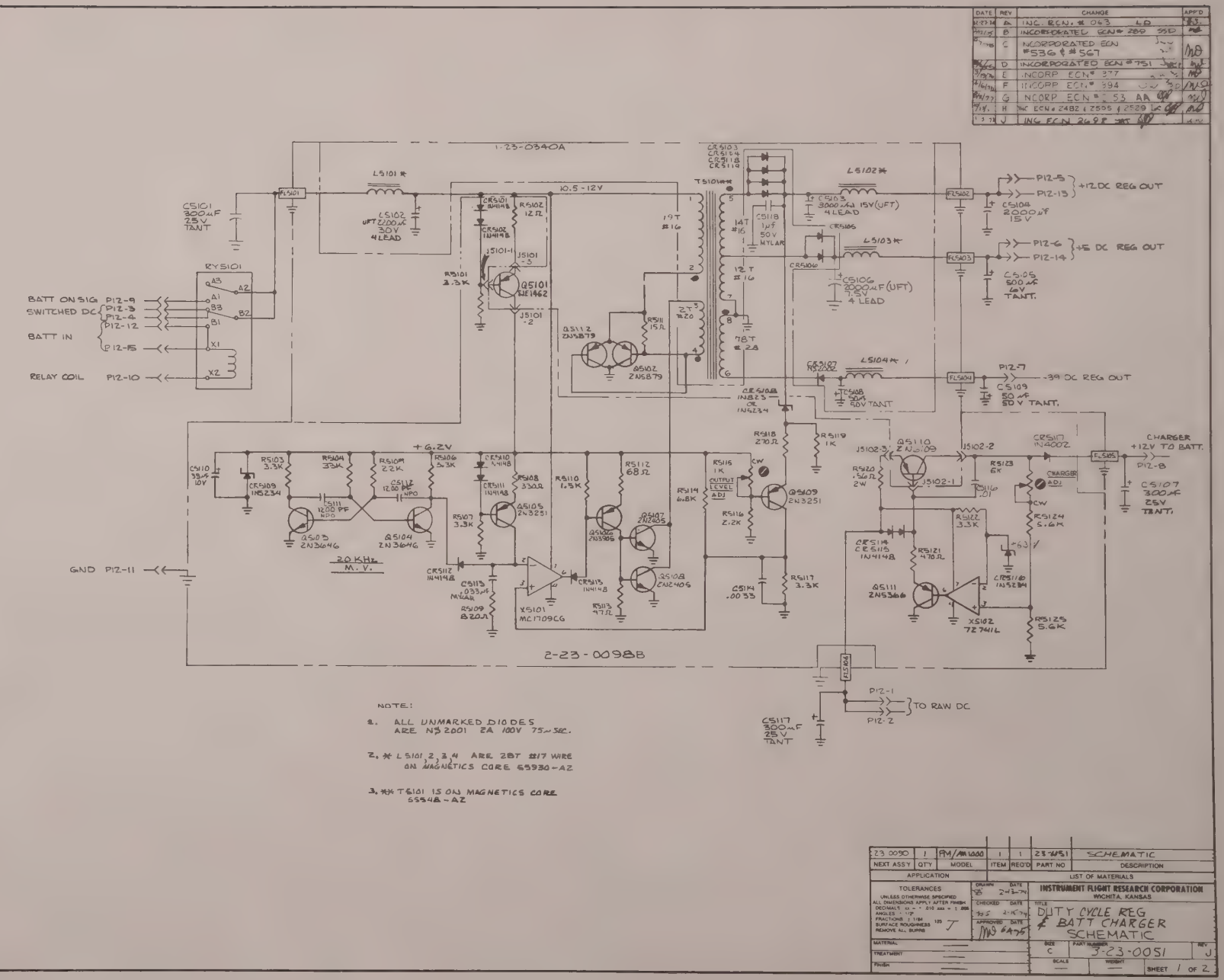

DATE | REV | CHANGE | APP'D
A | INC. ECN. # 063 LD
B | INCORPORATED ECN # 280
C | INCORPORATED ECN #536 & #567
D | INCORPORATED ECN #751
E | INCORP ECN # 377
F | INCORP ECN # 394
G | INCORP ECN # 53 AA
H | INC ECN # 2482 & 2505 & 2529
J | INC ECN 2698
1-23-0340A
2-23-0098B
BATT ON SIG P12-9
SWITCHED DC P12-3 P12-4 P12-12
BATT IN
P12-15
RELAY COIL P12-10
GND P12-11
10.5-12V
+6.2V
20 KHz M.V.
+12 DC REG OUT
-39 DC REG OUT
+12V TO BATT.
TO RAW DC
NOTE:
1. ALL UNMARKED DIODES ARE N.S. 2001 2A 100V 75 n SEC.
2. # LS101, 2, 3, 4 ARE 28T #17 WIRE ON MAGNETICS CORE 55930-A2
3. ## T5101 IS ON MAGNETICS CORE 55548-A2
23 2090 | 1 | PM/AM 1000 | 1 | 1 | 23-0051 | SCHEMATIC
NEXT ASSY | QTY | MODEL | ITEM | REQ'D | PART NO | DESCRIPTION
APPLICATION | LIST OF MATERIALS
TOLERANCES
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
DUTY CYCLE REG & BATT CHARGER SCHEMATIC
SIZE C | PART NUMBER 3-23-0051 | REV J
SCALE | WEIGHT | SHEET 1 OF 2

Figure 6-11

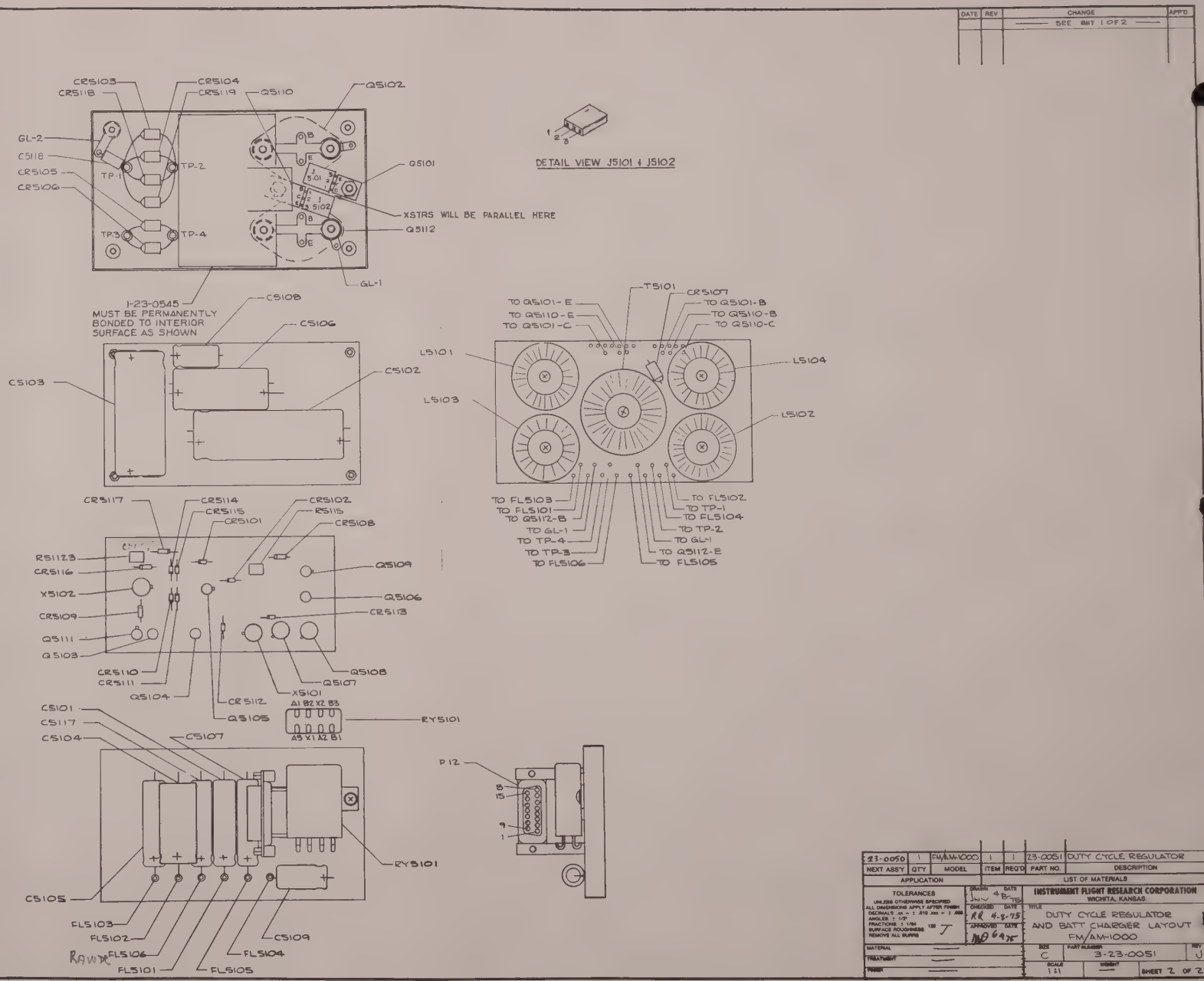
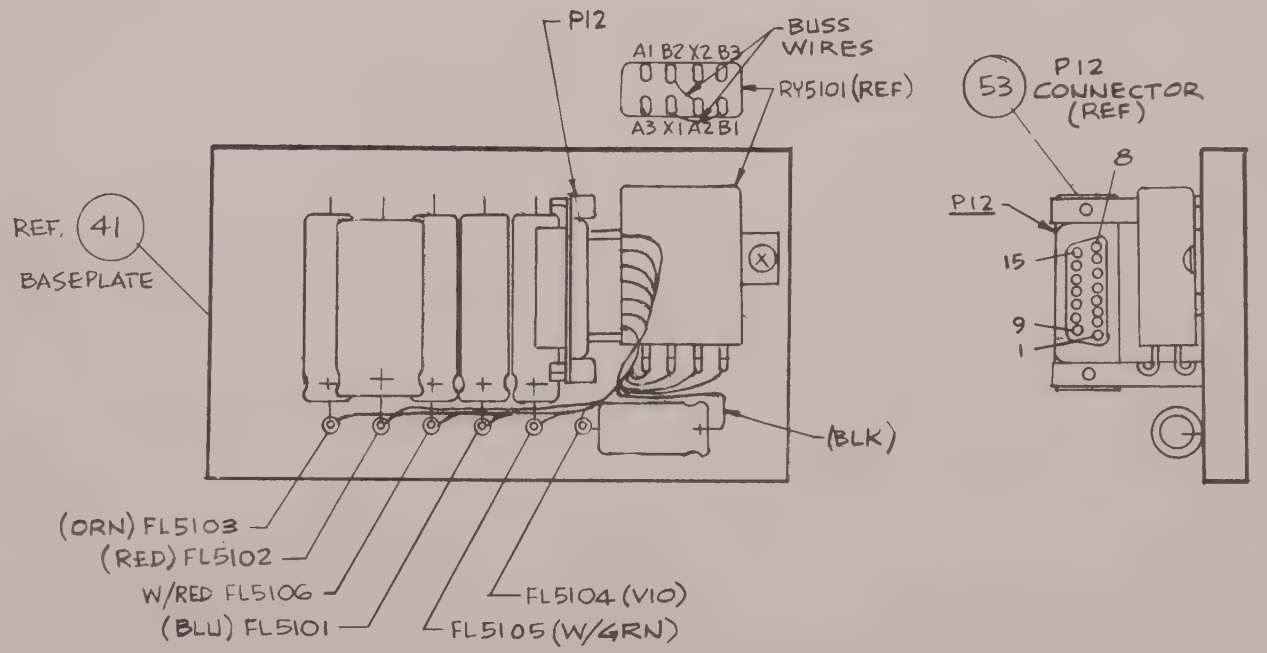

DATE | REV | CHANGE | APP'D
SEE SHT 1 OF 2
CR5103
CR5118
CR5104
CR5119
Q5110
Q5102
GL-2
C5118
CR5105
CR5106
TP-1
TP-2
TP-3
TP-4
Q5101
XSTRS WILL BE PARALLEL HERE
Q5112
GL-1
DETAIL VIEW J5101 & J5102
1-23-0545
MUST BE PERMANENTLY BONDED TO INTERIOR SURFACE AS SHOWN
C5108
C5106
C5103
C5102
T5101
CR5107
TO Q5101-E
TO Q5110-E
TO Q5101-C
TO Q5101-B
TO Q5110-B
TO Q5110-C
L5101
L5103
L5104
L5102
TO FL5103
TO FL5101
TO Q5112-B
TO GL-1
TO TP-4
TO TP-3
TO FL5106
TO FL5102
TO TP-1
TO FL5104
TO TP-2
TO GL-1
TO Q5112-E
TO FL5105
CR5117
CR5114
CR5115
CR5101
CR5102
R5115
CR5108
R5112B
CR5116
X5102
CR5109
Q5111
Q5103
Q5109
Q5106
CR5113
CR5110
CR5111
Q5104
CR5112
Q5105
X5101
Q5107
Q5108
C5101
C5117
C5104
C5107
A1 B2 X2 B3
A3 X1 A2 B1
RY5101
P12
C5105
FL5103
FL5102
RAWX FL5106
FL5101
FL5104
FL5105
C5109
23-0050 | 1 | FM/AM-1000 | 1 | 1 | 23-0051 | DUTY CYCLE REGULATOR
NEXT ASSY | QTY | MODEL | ITEM | REQ'D | PART NO. | DESCRIPTION
APPLICATION | LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS
DRAWN JNV 4-8-75 TB
CHECKED RR 4-8-75
APPROVED MD 4-9-75
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
TITLE
DUTY CYCLE REGULATOR AND BATT CHARGER LAYOUT FM/AM-1000
MATERIAL
TREATMENT
FINISH
SIZE C
PART NUMBER 3-23-0051
REV J
SCALE 1:1
WEIGHT
SHEET 2 OF 2

Figure 6-12

DATE	REV	CHANGE	APP'D
4-8-76	B	INCORP. ECN# 1394 WW SMD	MD
9/27/77	C	GEN. CORRECTION & UPDATE JNJ WW	MD
3-19-76	A	INCORP. ECN#1377 WW SMD	MD

1. INSTALL BUSS WIRES W/SLEEVING ON RELAY 5101.
2. USING AMP TOOL #90265-1, CRIMP PINS ITEM 55 TO 15 WIRES & INSTALL IN P12.
3. INSTALL & SOLDER WIRES 25 & 26 FROM FL5101 TO RELAY & SOLDER.
4. CONNECT & SOLDER REMAINING WIRES FROM P12 PER WIRING LIST.



WIRING LIST (REF)

	WIRE NO.	FROM	TO	COLOR	GA	LGTH
	24	RY5101 -B1	RY5101 -X1	BUSS	22	
	25	RY5101 -B2	FL5101	BLUE	22	
	26	RY5101 -B2	FL5101	BLUE	22	
*	27	P12-1	FL5106	W/RED	22	
*	28	P12-2	FL5106	W/RED	22	
*	29	P12-3	RY5101 -B3	BLUE	22	
*	30	P12-4	RY5101 -B3	BLUE	22	
*	31	P12-5	FL5102	RED	22	
*	32	P12-6	FL5103	ORN	22	
*	33	P12-7	FL5104	PURPLE	22	
*	34	P12-8	FL5105	W/GRN	22	
*	35	P12-9	RY5101 -A1	GREEN	22	
*	36	P12-10	RY5101 -X2	WHITE	22	
*	37	P12-11	BASE PLATE GND	BLACK	22	
*	38	P12-12	RY5101 -B1	W/GRN	22	
*	39	P12-13	FL5102	RED	22	
*	40	P12-14	FL5103	ORN	22	
*	41	P12-15	RY5101 -B1	W/GRN	22	
	42	RY5101 -B2	-A2	BUSS	22	

REF DWG: ILLUST. 4-23-0384

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
23-0050	—	FM/AM-1000	1	1	23-0051	DUTY CYCLE REGULATOR

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .000
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN SIMMONS 10/21/75
CHECKED BCA 10/28/75
APPROVED 11-5-75

MATERIAL —
TREATMENT —
FINISH —

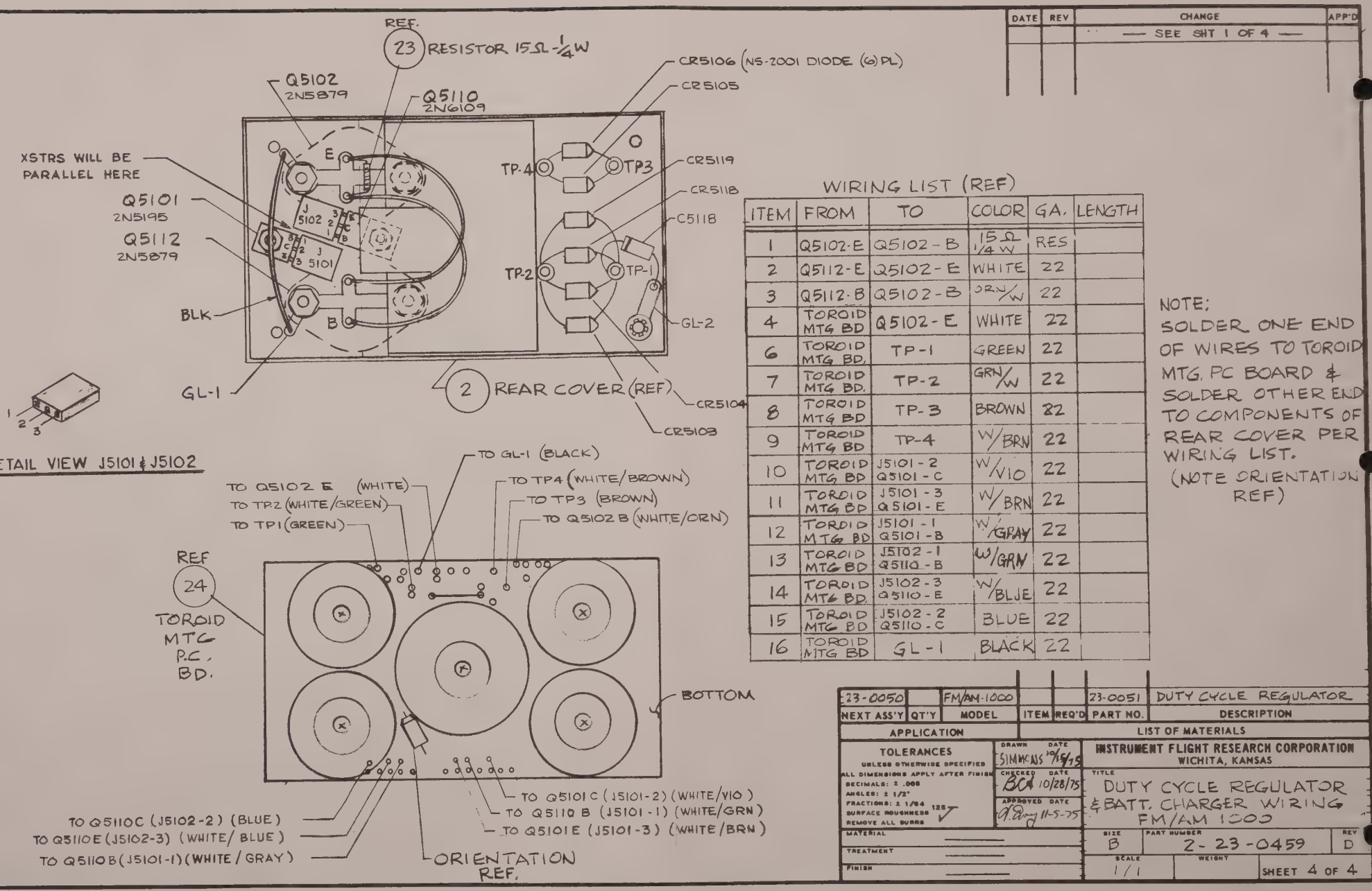
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE: DUTY CYCLE REGULATOR & BATT CHARGER WIRING FM/AM 1000

SIZE B | PART NUMBER 2-23-0459 | REV D
SCALE 1/1 | WEIGHT — | SHEET 1 OF 4

DATE	REV	CHANGE	APP'D
9/27/77	D	INCORP. ECN # 2505 WC	MD

Figure 6-13



DATE	REV	CHANGE	APP'D
		— SEE SHT 1 OF 4 —	

WIRING LIST (REF)

ITEM	FROM	TO	COLOR	GA.	LENGTH
1	Q5102-E	Q5102-B	15Ω 1/4W	RES	
2	Q5112-E	Q5102-E	WHITE	22	
3	Q5112-B	Q5102-B	ORN/W	22	
4	TOROID MTG BD	Q5102-E	WHITE	22	
6	TOROID MTG BD.	TP-1	GREEN	22	
7	TOROID MTG BD.	TP-2	GRN/W	22	
8	TOROID MTG BD	TP-3	BROWN	22	
9	TOROID MTG BD	TP-4	W/BRN	22	
10	TOROID MTG BD	J5101-2 Q5101-C	W/VIO	22	
11	TOROID MTG BD	J5101-3 Q5101-E	W/BRN	22	
12	TOROID MTG BD	J5101-1 Q5101-B	W/GRAY	22	
13	TOROID MTG BD	J5102-1 Q5110-B	W/GRN	22	
14	TOROID MTG BD.	J5102-3 Q5110-E	W/BLUE	22	
15	TOROID MTG BD	J5102-2 Q5110-C	BLUE	22	
16	TOROID MTG BD	GL-1	BLACK	22	

NOTE:
SOLDER ONE END OF WIRES TO TOROID MTG. PC BOARD & SOLDER OTHER END TO COMPONENTS OF REAR COVER PER WIRING LIST.
(NOTE ORIENTATION REF)

23-0050		FM/AM-1000			23-0051	DUTY CYCLE REGULATOR
NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN SIMMONS 10/16/75
CHECKED BCA 10/28/75
APPROVED 11-5-75

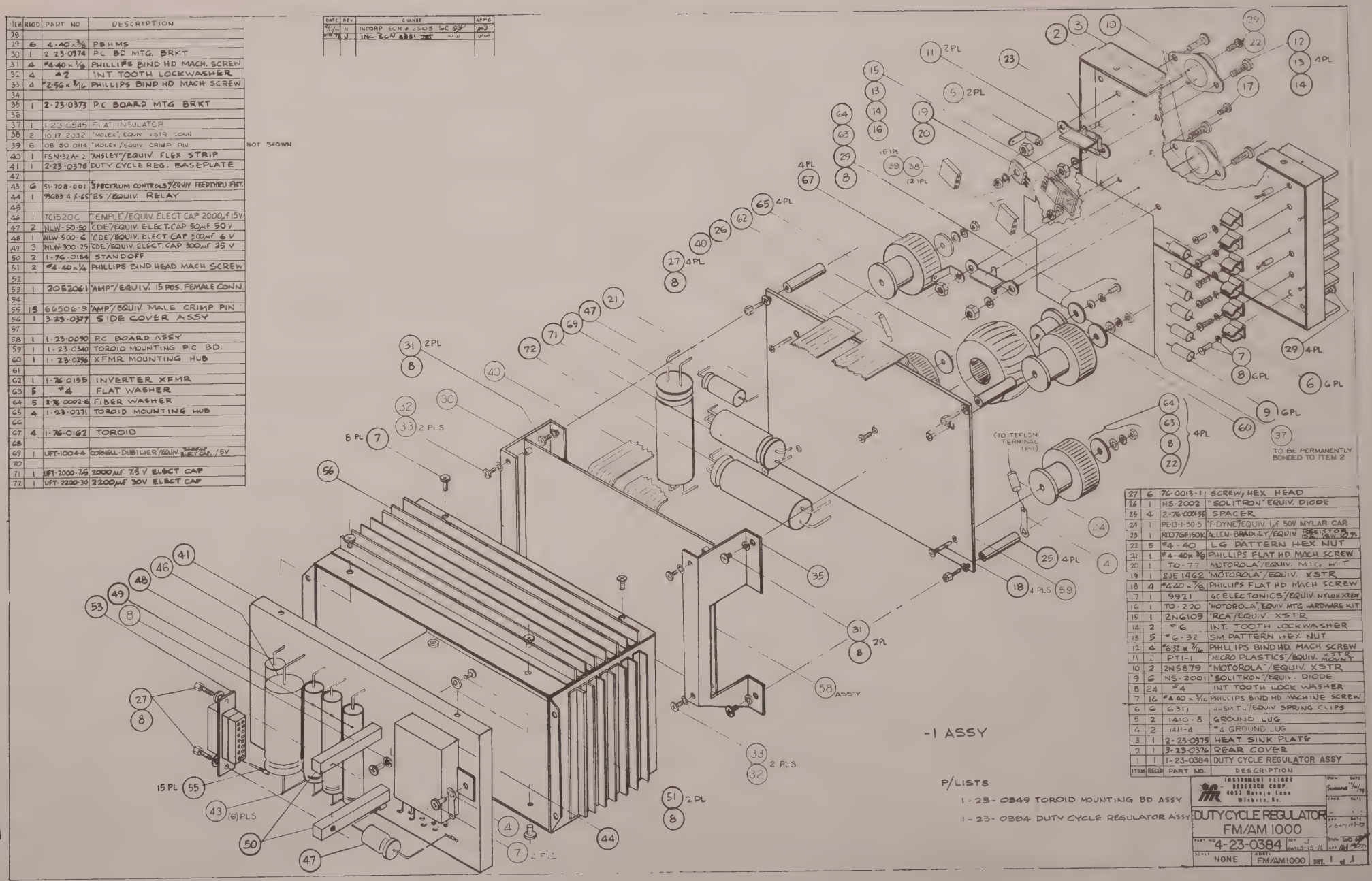
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE: DUTY CYCLE REGULATOR & BATT. CHARGER WIRING FM/AM 1000

MATERIAL
TREATMENT
FINISH

SIZE B | PART NUMBER 2-23-0459 | REV D
SCALE 1/1 | WEIGHT | SHEET 4 OF 4

Figure 6-14



ITEM	REQD	PART NO	DESCRIPTION
28			
29	6	4-40 x 3/8	PB HMS
30	1	2-23-0374	P.C. BD MTG. BRKT
31	4	#4-40 x 1/8	PHILLIPS BIND HD MACH. SCREW
32	4	#2	INT. TOOTH LOCKWASHER
33	4	#2-56 x 3/16	PHILLIPS BIND HD MACH SCREW
34			
35	1	2-23-0373	P.C BOARD MTG BRKT
36			
37	1	1-23-0545	FLAT INSULATOR
38	2	10 17 2032	"MOLEX", EQUIV. XSTR CONN
39	6	08 50 0114	"MOLEX / EQUIV. CRIMP PIN
40	1	FSN-32A-2	"ANSLEY"/EQUIV. FLEX STRIP
41	1	2-23-0378	DUTY CYCLE REG. BASEPLATE
42			
43	6	51-708-001	SPECTRUM CONTROLS/EQUIV FEEDTHRU FILT.
44	1	9360B 4 X-65	"ES / EQUIV. RELAY
45			
46	1	TC1520C	TEMPLE/EQUIV. ELECT CAP 2000μf 15V
47	2	NLW-50-50	"CDE"/EQUIV. ELECT. CAP 50μf 50 V
48	1	NLW-500-6	"CDE"/EQUIV. ELECT. CAP 500μf 6 V
49	3	NLW-300-25	"CDE"/EQUIV. ELECT. CAP 300μf 25 V
50	2	1-76-0184	STANDOFF
51	2	#4-40 x 1/4	PHILLIPS BIND HEAD MACH SCREW
52			
53	1	205206-1	"AMP"/EQUIV. 15 POS. FEMALE CONN.
54			
55	15	66506-9	"AMP"/EQUIV. MALE CRIMP PIN
56	1	3-23-0377	SIDE COVER ASSY
57			
58	1	1-23-0090	P.C BOARD ASSY
59	1	1-23-0340	TOROID MOUNTING P.C BD.
60	1	1-23-0296	XFMR MOUNTING HUB
61			
62	1	1-76-0135	INVERTER XFMR
63	5	#4	FLAT WASHER
64	5	2-76-0002-16	FIBER WASHER
65	4	1-23-0271	TOROID MOUNTING HUB
66			
67	4	1-76-0162	TOROID
68			
69	1	UFT-10044	CORNELL-DUBILIER/EQUIV. ELECT CAP, 15V
70			
71	1	UFT-2000-7.5	2000μf 7.5 V ELECT CAP
72	1	UFT-2200-30	2200μf 30V ELECT CAP

NOT SHOWN

DATE	REV	CHANGE	APP'D
7/1/76	H	INCORP ECN # 2503 LTR DTD	
8/31/76	J	INC ECN #851	

ITEM	REQD	PART NO.	DESCRIPTION
27	6	76-0013-1	SCREW, HEX HEAD
26	1	NS-2002	"SOLITRON" EQUIV. DIODE
25	4	2-76-000135	SPACER
24	1	PE-13-1-50-5	"T-DYNE"/EQUIV. 1μf 50V MYLAR CAP
23	1	RD7GF150K	ALLEN-BRADLEY/EQUIV. RESISTOR 15Ω 5% 10W
22	5	#4-40	LG PATTERN HEX. NUT
21	1	#4-40 x 3/8	PHILLIPS FLAT HD. MACH. SCREW
20	1	TO-77	MOTOROLA/EQUIV. MTG KIT
19	1	SJE 1462	"MOTOROLA"/EQUIV. XSTR
18	4	#4-40 x 7/8	PHILLIPS FLAT HD MACH SCREW
17	1	9921	GC ELECTONICS"/EQUIV. NYLON SCREW MOUNT
16	1	TO-220	"MOTOROLA" EQUIV MTG HARDWARE KIT
15	1	2N6109	"RCA"/EQUIV. XSTR
14	2	#6	INT. TOOTH LOCKWASHER
13	5	#6-32	SM PATTERN HEX NUT
12	4	#6-32 x 7/16	PHILLIPS BIND HD. MACH SCREW
11	2	PTI-1	"MICRO PLASTICS"/EQUIV. XSTR MOUNT
10	2	2N5879	"MOTOROLA"/EQUIV. XSTR
9	6	NS-2001	"SOLITRON"/EQUIV. DIODE
8	24	#4	INT TOOTH LOCK WASHER
7	16	#4-40 x 3/16	PHILLIPS BIND HD MACHINE SCREW
6	6	6311	4 PIN SM T-1 3/4/EQUIV SPRING CLIPS
5	2	1410-8	GROUND LUG
4	2	1411-4	#4 GROUND LUG
3	1	2-23-0375	HEAT SINK PLATE
2	1	3-23-0376	REAR COVER
1	1	1-23-0384	DUTY CYCLE REGULATOR ASSY

Figure 6-15

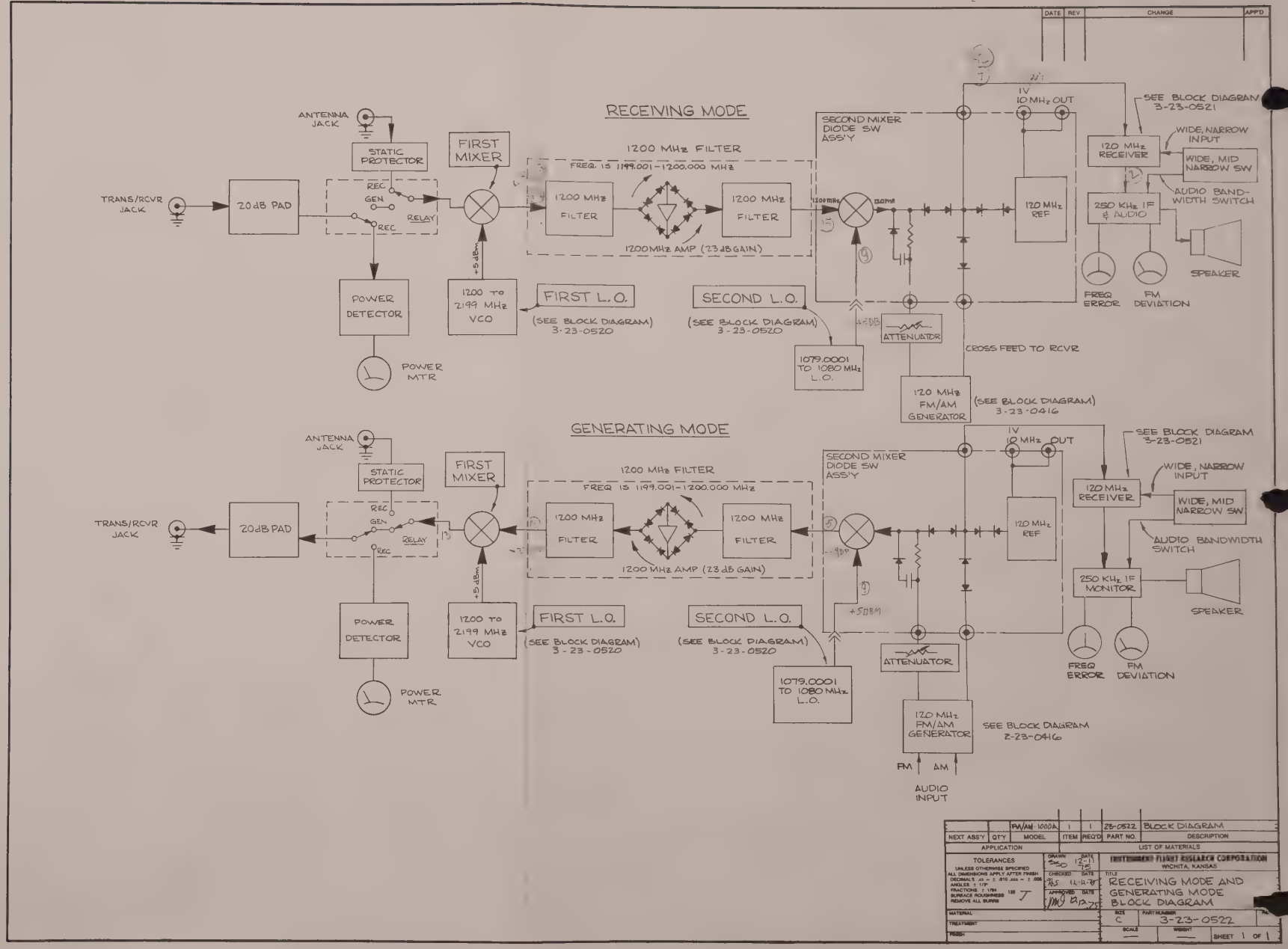
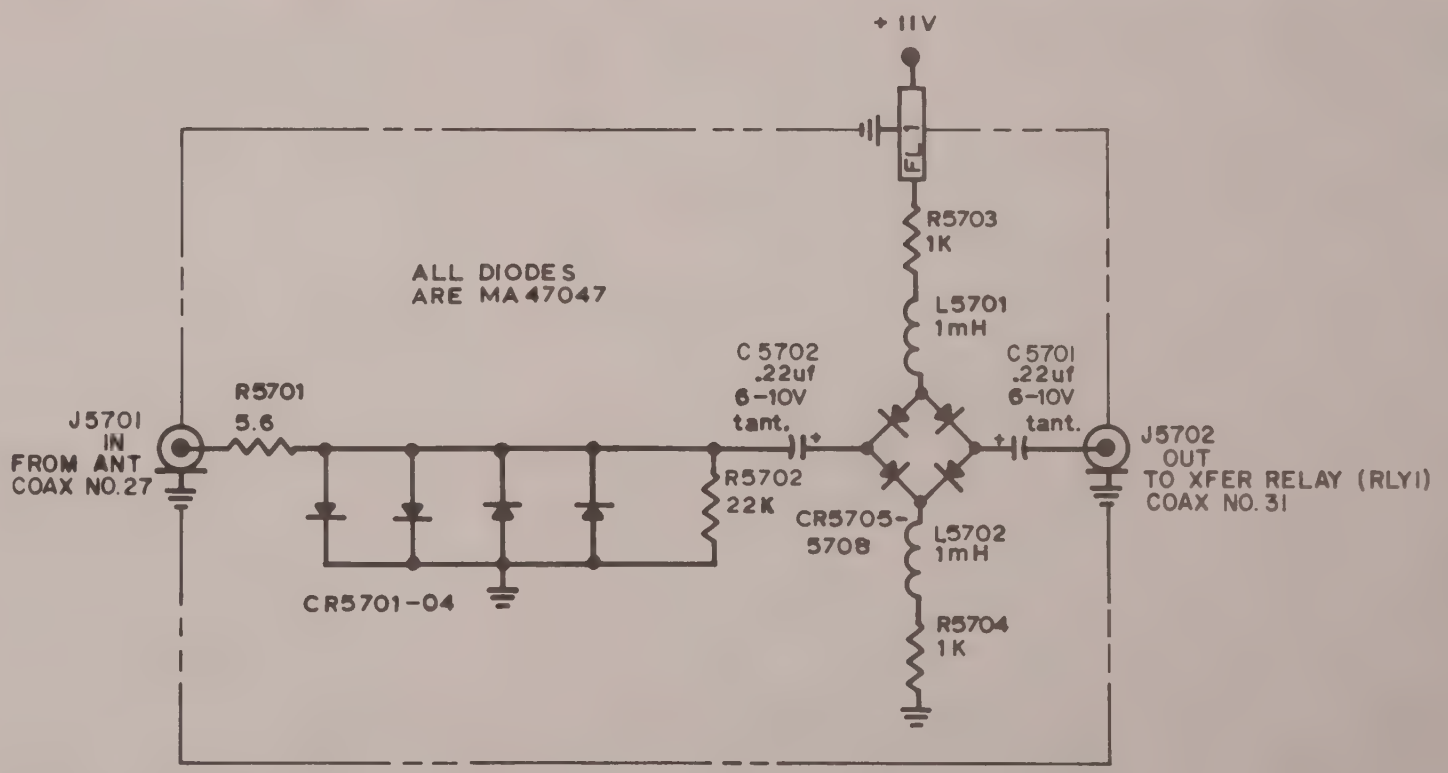

RECEIVING MODE
ANTENNA JACK
STATIC PROTECTOR
TRANS/RCVR JACK
20dB PAD
REC
GEN
RELAY
REC
FIRST MIXER
1200 MHz FILTER
FREQ IS 1199.001-1200.000 MHz
1200 MHz FILTER
1200 MHz AMP (23 dB GAIN)
1200 MHz FILTER
+5 dBm
POWER DETECTOR
POWER MTR
1200 TO 2199 MHz VCO
FIRST L.O.
(SEE BLOCK DIAGRAM) 3-23-0520
SECOND L.O.
(SEE BLOCK DIAGRAM) 3-23-0520
1079.0001 TO 1080 MHz L.O.
SECOND MIXER DIODE SW ASS'Y
1200 MHz
120 MHz
120 MHz REF
ATTENUATOR
+5 DBM
CROSS FEED TO RCVR
120 MHz FM/AM GENERATOR
(SEE BLOCK DIAGRAM) 3-23-0416
1V 10 MHz OUT
SEE BLOCK DIAGRAM 3-23-0521
120 MHz RECEIVER
WIDE, NARROW INPUT
WIDE, MID NARROW SW
AUDIO BAND-WIDTH SWITCH
250 KHz IF & AUDIO
SPEAKER
FREQ ERROR
FM DEVIATION
GENERATING MODE
ANTENNA JACK
STATIC PROTECTOR
TRANS/RCVR JACK
20dB PAD
REC
GEN
RELAY
REC
FIRST MIXER
1200 MHz FILTER
FREQ IS 1199.001-1200.000 MHz
1200 MHz FILTER
1200 MHz AMP (23 dB GAIN)
1200 MHz FILTER
+5 dBm
POWER DETECTOR
POWER MTR
1200 TO 2199 MHz VCO
FIRST L.O.
(SEE BLOCK DIAGRAM) 3-23-0520
SECOND L.O.
(SEE BLOCK DIAGRAM) 3-23-0520
1079.0001 TO 1080 MHz L.O.
SECOND MIXER DIODE SW ASS'Y
1200 MHz
120 MHz
120 MHz REF
ATTENUATOR
+50BM
120 MHz FM/AM GENERATOR
SEE BLOCK DIAGRAM 2-23-0416
FM
AM
AUDIO INPUT
1V 10 MHz OUT
SEE BLOCK DIAGRAM 3-23-0521
120 MHz RECEIVER
WIDE, NARROW INPUT
WIDE, MID NARROW SW
AUDIO BANDWIDTH SWITCH
250 KHz IF MONITOR
SPEAKER
FREQ ERROR
FM DEVIATION
DATE
REV
CHANGE
APP'D
FM/AM-1000A
23-0522
BLOCK DIAGRAM
NEXT ASS'Y
QTY
MODEL
ITEM
REQ'D
PART NO.
DESCRIPTION
APPLICATION
LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS
REMOVE ALL BURRS
DRAWN
CHECKED
APPROVED
DATE
MATERIAL
TREATMENT
FINISH
SIZE
C
PART NUMBER
3-23-0522
SCALE
WEIGHT
SHEET 1 OF 1
TITLE
RECEIVING MODE AND GENERATING MODE BLOCK DIAGRAM
WICHITA, KANSAS

Figure 6-16



DATE	REV	CHANGE	APP'D
1/5/78	B	INCORP. ECN #2678 AA	WW
6-1-76	A	INCORP ECN #1475 RKK	MW

INSTRUMENT FLIGHT RESEARCH CORP.
4053 Navajo Lane
Wichita, Ks.

STATIC DISCHARGE PROTECTOR
(FM-1000)

DWN	DATE		
CHKD	DATE		
APP	DATE		
PART NO	REV	DWN	
1-23-0457	B	APP	
SCALE	MODEL	SHT.	
—	FM-1000	1 of 1	

Figure 6-17

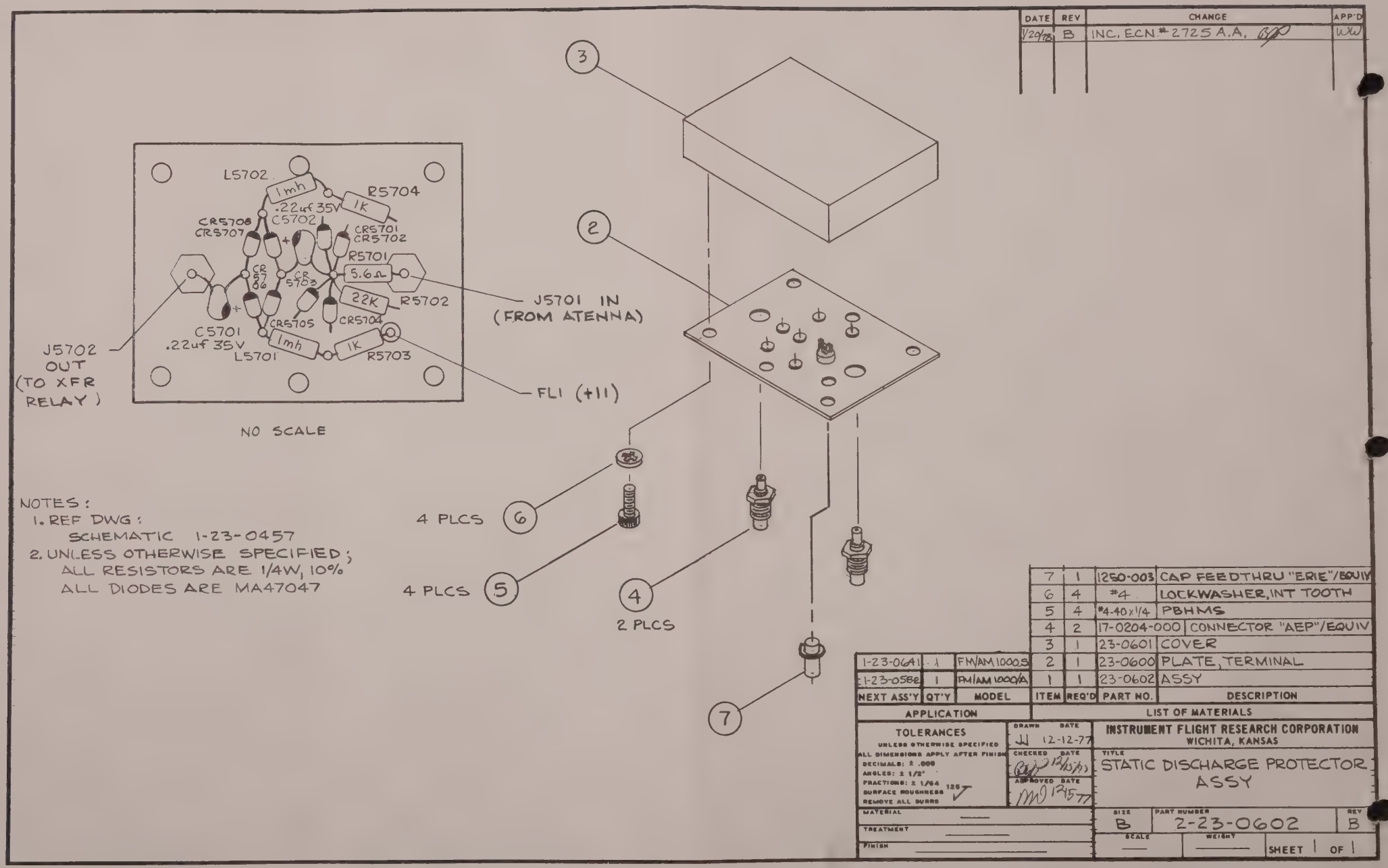
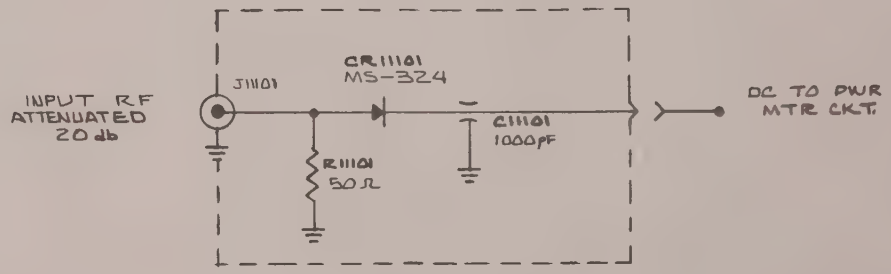

L5702
1mh
.22uf 35V
C5702
R5704
1K
CR5708
CR5707
CR5701
CR5702
R5701
5.6Ω
CR5706
CR5703
22K
R5702
CR5705
CR5704
C5701
.22uf 35V
L5701
1mh
1K
R5703
J5702 OUT (TO XFR RELAY)
J5701 IN (FROM ATENNA)
FL1 (+11)
NO SCALE
3
2
4 PLCS
6
4 PLCS
5
4
2 PLCS
7
NOTES:
1. REF DWG: SCHEMATIC 1-23-0457
2. UNLESS OTHERWISE SPECIFIED; ALL RESISTORS ARE 1/4W, 10% ALL DIODES ARE MA47047
DATE | REV | CHANGE | APP'D
1/29/78 | B | INC. ECN # 2725 A.A.
7 | 1 | 1250-003 | CAP FEEDTHRU "ERIE"/EQUIV
6 | 4 | #4 | LOCKWASHER, INT TOOTH
5 | 4 | #4-40x1/4 | PBHMS
4 | 2 | 17-0204-000 | CONNECTOR "AEP"/EQUIV
3 | 1 | 23-0601 | COVER
2 | 1 | 23-0600 | PLATE, TERMINAL
1 | 1 | 23-0602 | ASSY
1-23-0641 | 1 | FM/AM 1000S
1-23-0582 | 1 | FM/AM 1000A
NEXT ASS'Y | QT'Y | MODEL | ITEM | REQ'D | PART NO. | DESCRIPTION
APPLICATION
LIST OF MATERIALS
TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS: ± .005 ANGLES: ± 1/2° FRACTIONS: ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS
DRAWN JJ 12-12-77
CHECKED 12/15/77
APPROVED 12/15/77
INSTRUMENT FLIGHT RESEARCH CORPORATION WICHITA, KANSAS
TITLE STATIC DISCHARGE PROTECTOR ASSY
MATERIAL
TREATMENT
FINISH
SIZE B
PART NUMBER 2-23-0602
REV B
SCALE
WEIGHT
SHEET 1 OF 1

Figure 6-18



DATE	REV	CHANGE	APP'D

NEXT ASS'Y	QTY	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
—	—	FM/AM 1080	—	—	23-0111	SCHEMATIC

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN DATE 3-27-74
CHECKED DATE W.S. 3-27-74
APPROVED DATE

MATERIAL
TREATMENT
FINISH

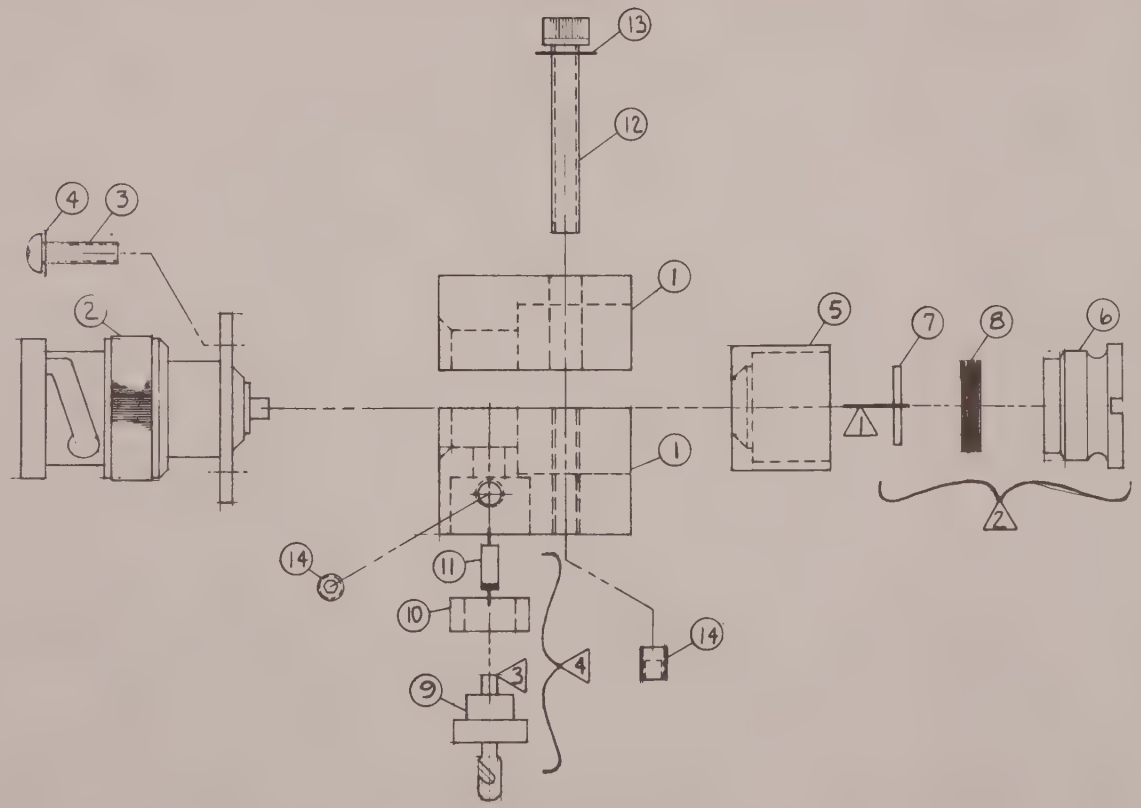
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

TITLE
POWER MONITOR
(SCHEMATIC)

SIZE | PART NUMBER 1-23-0111 | REV

SCALE | WEIGHT | SHEET 1 OF 1

Figure 6-19



DATE	REV	CHANGE	APP'D
4-18-77	C	ORIGINAL RELEASE AFA	MO
2-21-78	D	INCORP ECN # 2831 T.T.	MO

14	2	#4-40-1/8	SOCKET HEAD SET SCREW
13	2	# 4	INT. TOOTH LOCKWASHER
12	2	#4-40-3/4	SOCKET HEAD SCREW
11	1	MS-324	DIODE
10	1	76-0001-18	BUSHING
9	1	FASC-102W	1000pf FEEDTHRU CAP
8	4	BS-R2	BELLEVILLE WASHER
7	1	62D-51250	50Ω DISC. RESISTOR
6	1	2-23-0635-2	PLUG
5	1	2-23-0635-1	BUSHING
4	4	#2	INT. TOOTH LOCKWASHER
3	4	#2-56-3/16	PHILLIPS BIND HD. MACH. SCREW
2	1	1-76-0239	MALE "BNC" CONN.
1	1	23-0337	POWER MONITOR BLOCK SET
-	-	23-0228	POWER MONITOR ASS'Y.

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
23-0582	1	FM/AM-1000				

APPLICATION

LIST OF MATERIALS

7. ALL PARTS OF ANY ASSEMBLY STEP TO BE THOROUGHLY CLEANED BEFORE PROCEEDING TO NEXT STEP.
6. CHECK RESISTANCE VALUE TO ASSURE 50Ω ±5Ω.
5. ASSEMBLE TO ATTACH CONNECTOR CENTER CONDUCTOR TO RESISTOR AND DIODE IN HOUSING.
4. ATTACH DIODE TO FEEDTHRU AND INSTALL IN BUSHING.
3. CUT FEEDTHRU CAP CENTER CONDUCTOR (3/32 PROTRUDING).
2. PLACE RESISTOR IN BUSHING WITH 4 BELLVILLE WASHERS (STACKED AS SHOWN). INSTALL PLUG FLUSH, FINGER TIGHT UNTIL SEATED FIRMLY AT RIM. CHECK FOR CRACKS IN RESISTOR 6
1. INSTALL NO. 22 BUSS (5/16 PROTRUDING) in 50Ω DISC RESISTOR.

NOTES:

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN DATE 4/18/77
CHECKED DATE 4-18-77
APPROVED DATE 4-18-77

MATERIAL
TREATMENT
FINISH

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
POWER MONITOR ASSEMBLY

SIZE B | DRAWING NUMBER 2-23-0228 | REV D

SCALE 2:1 | WEIGHT — | SHEET 1 OF 1

Figure 6-20

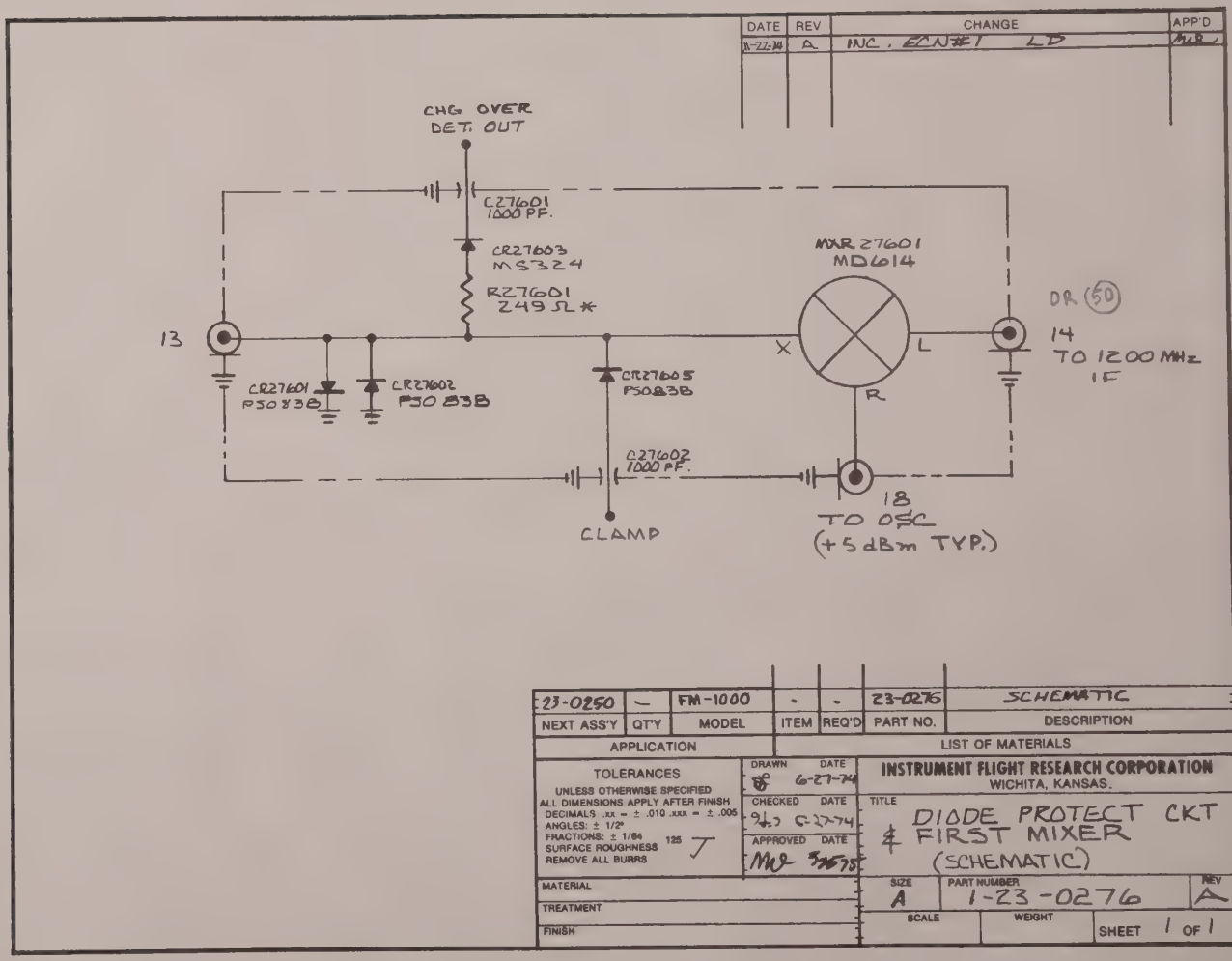
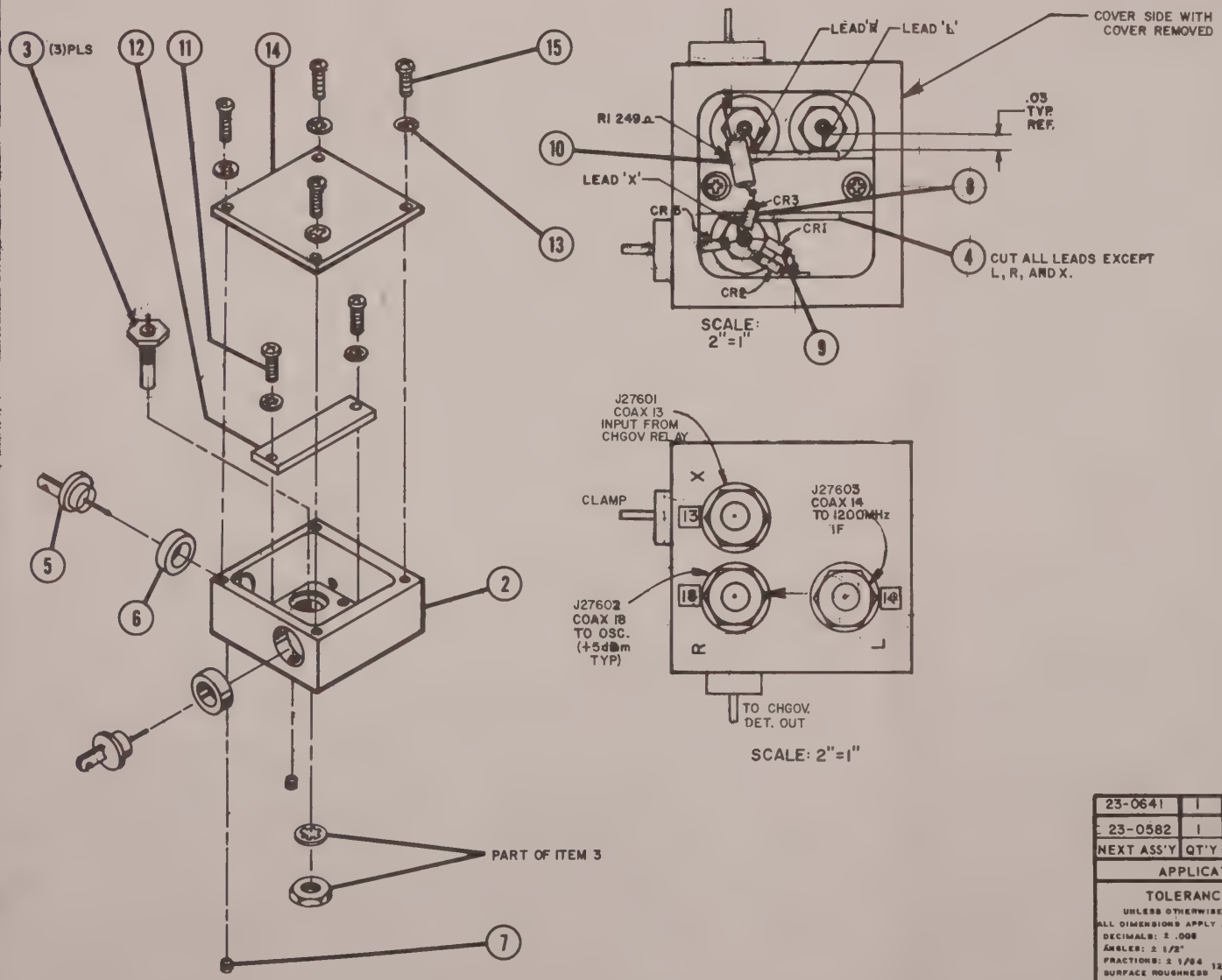

DATE
REV
CHANGE
APP'D
11-22-74
A
INC. ECN#1 LD
CHG OVER DET. OUT
C27601 1000 PF.
CR27603 MS324
R27601 249 Ω ±
MXR 27601 MD614
DR (50)
13
14 TO 1200 MHz IF
X
L
R
CR27601 P5083B
CR27602 P5083B
CR27605 P5083B
C27602 1000 PF.
18 TO 0SC (+5 dBm TYP.)
CLAMP
23-0250
—
FM-1000
-
-
23-0276
SCHEMATIC
NEXT ASS'Y
QTY
MODEL
ITEM
REQ'D
PART NO.
DESCRIPTION
APPLICATION
LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS
DRAWN DATE 6-27-74
CHECKED DATE 6-27-74
APPROVED DATE 3/26/75
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.
TITLE
DIODE PROTECT CKT & FIRST MIXER (SCHEMATIC)
MATERIAL
TREATMENT
FINISH
SIZE A
PART NUMBER 1-23-0276
REV A
SCALE
WEIGHT
SHEET 1 OF 1

Figure 6-21



DATE	REV	CHANGE	APP'D
4-19-78	C	REDRAWN	
28 JUN 78	C-2	INC. ECN #3036 TenEyck WW	WW

ITEM	REQ'D	PART NO.	DESCRIPTION
15	4	#2-56x1/4	PBHMS
14	1	1-23-0336	COVER
13	6	#2	INT TOOTH LKWSHR.
12	1	1-23-0350	CLAMP BRACKET
11	2	#2-56x5/16	PBHMS
10	1	[illegible]	"CORNING"/EQUIV 1/4W, 1% TOL. RES.
9	3	PSO-838	"PARAMETRICS"/EQUIV DIODE
8	1	MS 324	"SOLITRON"/EQUIV DIODE
7	2	#2-56x3/32	SOCKET HEAD SET SCREW
6	2	2-76-0001-18	BUSHING
5	2	FA5C-102W	"ALLEN-BRADLEY"/EQUIV 1000pf FDTHRU CAP.
4	1	MD614	"ANZAC"/EQUIV MIXER
3	3	[illegible]	"SEALECTRO"/EQUIV SMB MALE CONN.
2	1	2-23-0335	FIRST MIXER BLOCK
1	1	2-23-0250	FIRST MIXER ASSEMBLY

NEXT ASS'Y	QT'Y	MODEL
23-0641	1	FM/AM 1000B
23-0582	1	FM/AM 1000A

APPLICATION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN TenEyck DATE 4-19-78
CHECKED BJP 4-27-78
APPROVED MJ-15-78

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
FIRST MIXER ASSEMBLY

MATERIAL SEE "LIST OF MATERIALS"
TREATMENT
FINISH

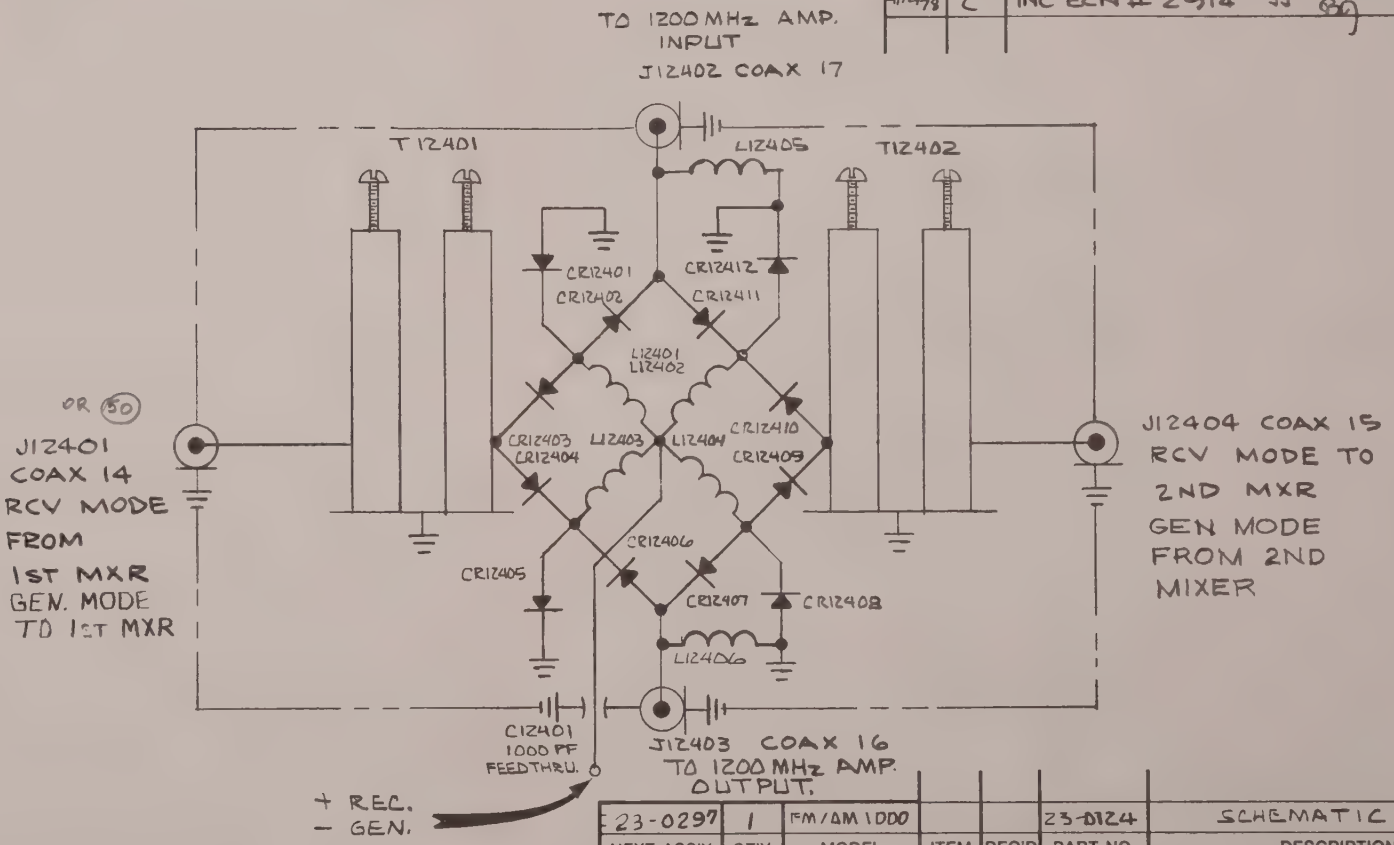
SIZE B | PART NUMBER 2-23-0250 | REV C-2
SCALE 1"=1" | WEIGHT —— | SHEET 1 OF 1

1. SCHEMATIC NO. 1-23-0276

NOTES:

Figure 6-22

DATE	REV	CHANGE	APP'D
723	A	INC ECN # 1 LD	
7/75	B	INC ECN # 802 DLP	
4/12/78	C	INC ECN # 2914 JJ BD	WW



NOTE:
1. ALL DIODES ARE MA47047
2. ALL CHOKE COILS ARE .33 μH

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
23-0297	1	FM/AM 1000			23-0124	SCHEMATIC

APPLICATION | LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN DATE 4-5-74
CHECKED DATE 8-6-74
APPROVED DATE 7/75

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

TITLE: 1200MHz FILTER & REC.-GEN. SW.

MATERIAL
TREATMENT
FINISH

SIZE A | PART NUMBER 1-23-0124 | REV C
SCALE — | WEIGHT — | SHEET 1 OF 1

Figure 6-23

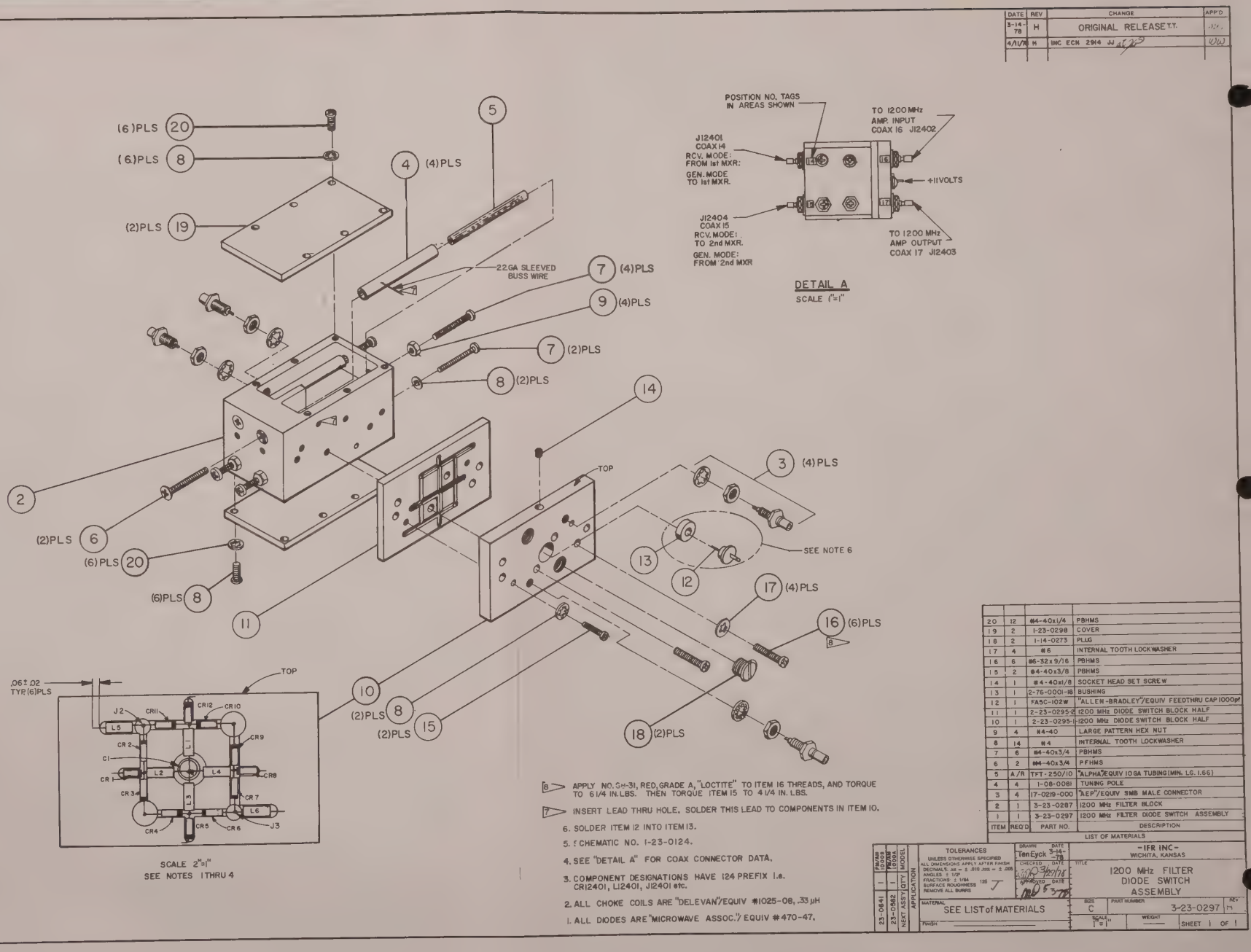
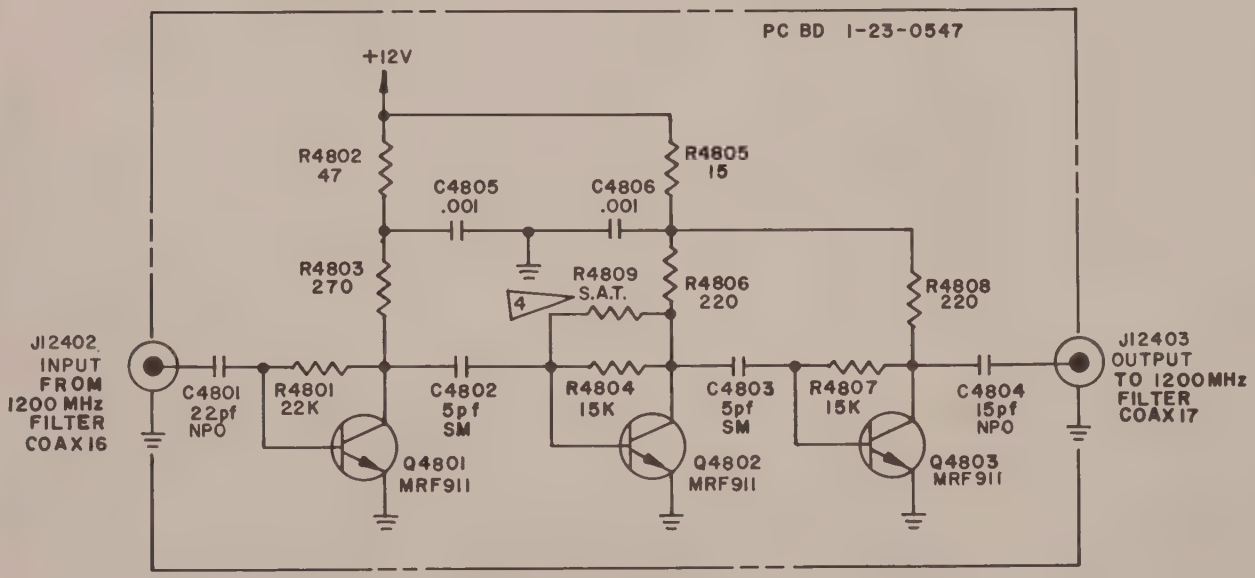

DATE | REV | CHANGE | APP'D
3-14-78 | H | ORIGINAL RELEASE T.T.
4/1/78 | M | INC ECN 2914 JJ
(6)PLS 20
(6)PLS 8
(2)PLS 19
5
4 (4)PLS
22GA SLEEVED BUSS WIRE
7 (4)PLS
9 (4)PLS
7 (2)PLS
8 (2)PLS
14
2
(2)PLS 6
(6)PLS 20
(6)PLS 8
11
TOP
3 (4)PLS
SEE NOTE 6
13
12
17 (4)PLS
16 (6)PLS
B
10
(2)PLS 8
(2)PLS 15
18 (2)PLS
POSITION NO. TAGS IN AREAS SHOWN
TO 1200 MHz AMP. INPUT COAX 16 J12402
J12401 COAX 14 RCV. MODE: FROM 1st MXR: GEN. MODE TO 1st MXR.
+11 VOLTS
J12404 COAX 15 RCV. MODE: TO 2nd MXR. GEN. MODE: FROM 2nd MXR
TO 1200 MHz AMP OUTPUT COAX 17 J12403
DETAIL A
SCALE 1"=1"
.062 ± .02 TYP (6) PLS
TOP
J2
CR11
CR12
CR10
L5
CR9
CR2
C1
CR1
L2
L4
CR8
CR3
CR7
L6
CR4
CR5
CR6
J3
SCALE 2"=1"
SEE NOTES 1 THRU 4
B APPLY NO. SM-31, RED, GRADE A, "LOCTITE" TO ITEM 16 THREADS, AND TORQUE TO 6 1/4 IN. LBS. THEN TORQUE ITEM 15 TO 4 1/4 IN. LBS.
7 INSERT LEAD THRU HOLE. SOLDER THIS LEAD TO COMPONENTS IN ITEM 10.
6. SOLDER ITEM 12 INTO ITEM 13.
5. SCHEMATIC NO. 1-23-0124.
4. SEE "DETAIL A" FOR COAX CONNECTOR DATA.
3. COMPONENT DESIGNATIONS HAVE 124 PREFIX I.e. CR12401, L12401, J12401 etc.
2. ALL CHOKE COILS ARE "DELEVAN"/EQUIV #1025-08, .33 μH
1. ALL DIODES ARE "MICROWAVE ASSOC."/ EQUIV #470-47.
20 | 12 | #4-40x1/4 | PBHMS
19 | 2 | 1-23-0298 | COVER
18 | 2 | 1-14-0273 | PLUG
17 | 4 | #6 | INTERNAL TOOTH LOCKWASHER
16 | 6 | #6-32x9/16 | PBHMS
15 | 2 | #4-40x3/8 | PBHMS
14 | 1 | #4-40x1/8 | SOCKET HEAD SET SCREW
13 | 1 | 2-76-0001-18 | BUSHING
12 | 1 | FA5C-102W | "ALLEN-BRADLEY"/EQUIV FEEDTHRU CAP 1000pf
11 | 1 | 2-23-0295-2 | 1200 MHz DIODE SWITCH BLOCK HALF
10 | 1 | 2-23-0295-1 | 1200 MHz DIODE SWITCH BLOCK HALF
9 | 4 | #4-40 | LARGE PATTERN HEX NUT
8 | 14 | #4 | INTERNAL TOOTH LOCKWASHER
7 | 6 | #4-40x3/4 | PBHMS
6 | 2 | #4-40x3/4 | PFHMS
5 | A/R | TFT-250/10 | "ALPHA"/EQUIV 10GA TUBING (MIN. LG. 1.66)
4 | 4 | 1-08-0081 | TUNING POLE
3 | 4 | 17-0219-000 | "AEP"/EQUIV SMB MALE CONNECTOR
2 | 1 | 3-23-0287 | 1200 MHz FILTER BLOCK
1 | 1 | 3-23-0297 | 1200 MHz FILTER DIODE SWITCH ASSEMBLY
ITEM | REQ'D | PART NO. | DESCRIPTION
LIST OF MATERIALS
23-0641 | FROM 23-0582 | 1
23-0582 | FROM 23-0582 | 1
NEXT ASSY | QTY | MODEL
APPLICATION
TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .XX = ± .010 .XXX = ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS REMOVE ALL BURRS 125 J
DRAWN Ten Eyck 3-14-78
CHECKED DATE
APPROVED DATE
MATERIAL SEE LIST of MATERIALS
FINISH
- IFR INC - WICHITA, KANSAS
TITLE 1200 MHz FILTER DIODE SWITCH ASSEMBLY
SIZE C
PART NUMBER 3-23-0297
REV. M
SCALE 1"=1"
WEIGHT
SHEET 1 OF 1

Figure 6-24

DATE	REV	CHANGE	APP'D
1-7-78	A	INC ECN 2682	WAS
1-16-79	A-1	INC ECN 2709	WAS



NOTES:

1. ALL RESISTORS ARE IN 1/4 W, 10%, AND VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. LAST NUMBERS USED: R4809, C4806, Q4803

4 SELECT AT TEST TO REDUCE GAIN

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	23-0548	SCHEMATIC

LIST OF MATERIALS

NEXT ASSY	QTY	MODEL
23-0549	1	RX/AM 1200A

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

DRAWN SO DATE 5-5-78
CHECKED WJ DATE 5-10-78
APPROVED MW DATE 5-8-78

MATERIAL —
FINISH —

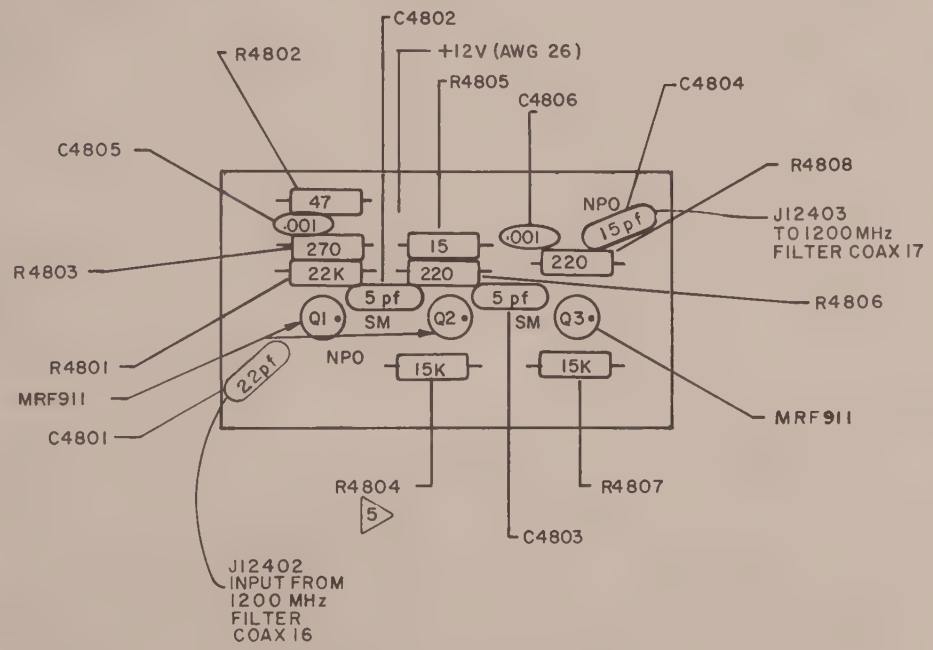
- IFR INC -
WICHITA, KANSAS

TITLE
1200MHz AMPLIFIER

SIZE B | PART NUMBER 2-23-0548 | REV A-1
SCALE — | WEIGHT — | SHEET 1 OF 1

Figure 6-25

DATE	REV	CHANGE	APP'D
4-11-77	A	INITIAL RELEASE	MD



5 R4809 SAT PARALLELS R4804 AS REQ'D

4. MAXIMUM HEIGHT OF COMPONENTS FROM COMPONENT SIDE OF BOARD IS .35.

3. COMPONENT LEADS MAY EXTEND .04-.06 BEYOND BOTTOM OF BOARD AFTER SOLDERING

2. UNLESS OTHERWISE SPECIFIED:
   ALL CAPACITORS ARE IN uF
   ALL RESISTORS ARE 1/4W ±10%

1. REF DWG:
   PC BOARD 1-23-0547
   SCHEMATIC 2-23-0548

NOTES:

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
23-0554	1	FM/AM1000S				
23-0554	1	FM/AM1000A	1	1	23-0549	ASSY P/L

APPLICATION | LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN DATE 4/11/77
CHECKED DATE
APPROVED DATE

MATERIAL
TREATMENT
FINISH

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

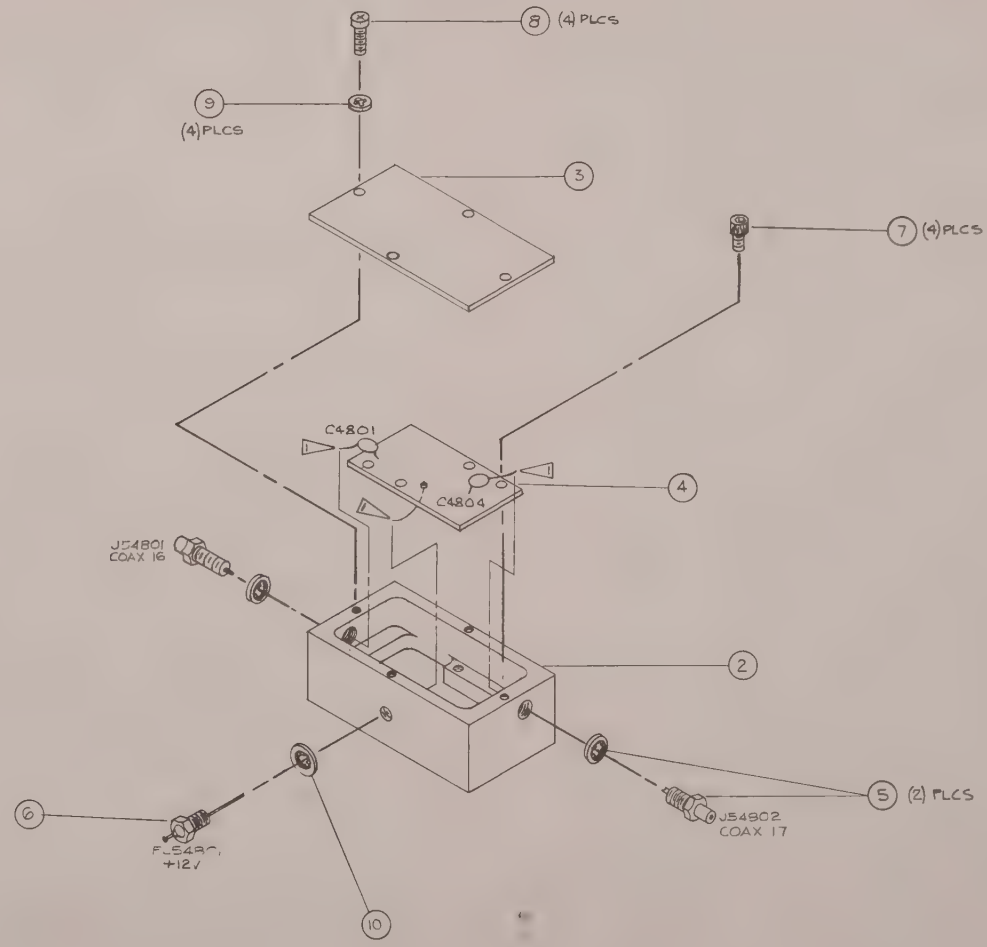
TITLE
1200 Mhz AMPLIFIER
PC BD ASSY

SIZE B | PART NUMBER 2-23-0549 | REV A

SCALE | WEIGHT | SHEET 1 OF 1

Figure 6-26

DATE	REV	CHANGE	APPD
2/17/78	A	INC ECN# 2682 INIT RELEASE	
5/14/78	B	INC ECN# 2802 Inc	



ITEM	REQ'D	PART NO.	DESCRIPTION
10	1	NO 8	LOCKWASHER, INT TOOTH
9	4	NO. 4	LOCKWASHER, INT TOOTH
8	4	4-40 x 1/4	PBHMS
7	4	4-40 x 1/4	SHCS
6	1	51-712-001	FILTER, "SPECTRUM CONT"/EQUIV
5	2	80-9939-002	CONN, COAX AEP", EQUIV
4	1	23-0549	1200 MHz AMP PC BD ASSY
3	1	23-0553	COVER
2	1	23-0552	HOUSING
1	1	23-0554	1200 MHz AMP P/L

LIST OF MATERIALS

NEXT ASSY 23-0492 | QTY 1 | MODEL MODELS 2, 3 & 4 | APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .X = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN DATE 2-17-78
CHECKED DATE
APPROVED DATE 3/15/78

- IFR INC -
WICHITA, KANSAS

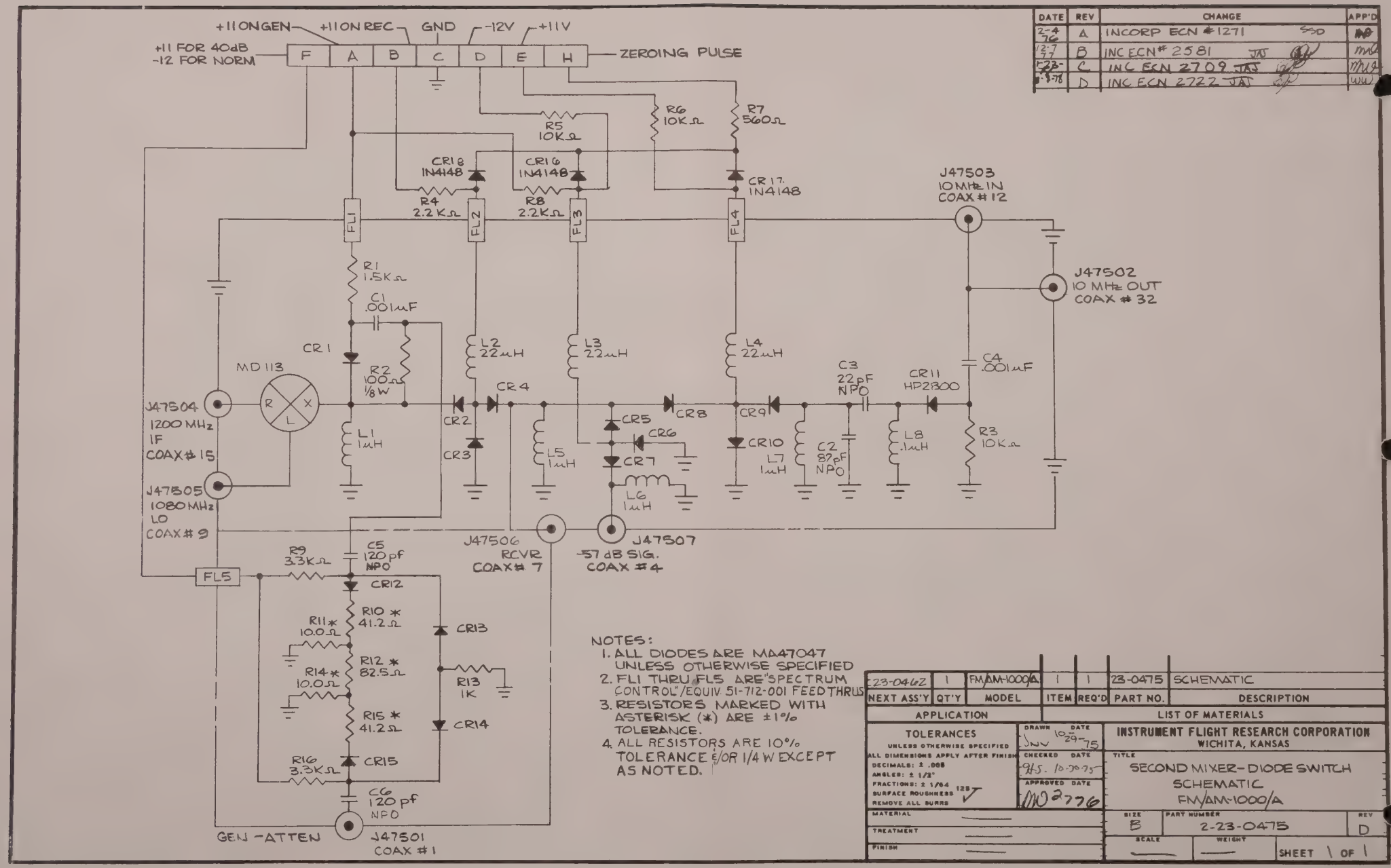
TITLE: 1200 MHz AMPLIFIER ASSY

MATERIAL
FINISH

SIZE C | PART NUMBER 3-23-0554 | REV B
SCALE 1:1 | WEIGHT | SHEET 1 OF 1

NOTES:
1. SOLDER TO COPRESPONDING CENTER CONDUCTOR

Figure 6-27



DATE	REV	CHANGE	APP'D
2-4-76	A	INCORP ECN #1271 SSD	MD
3-7-77	B	INC ECN # 2581 JAS	MD
3-23-78	C	INC ECN 2709 JAS	MD
9-5-78	D	INC ECN 2722 JAS	MD

NOTES:
1. ALL DIODES ARE MA47047 UNLESS OTHERWISE SPECIFIED
2. FL1 THRU FL5 ARE "SPECTRUM CONTROL"/EQUIV 51-712-001 FEEDTHRUS
3. RESISTORS MARKED WITH ASTERISK (*) ARE ±1% TOLERANCE.
4. ALL RESISTORS ARE 10% TOLERANCE E/OR 1/4 W EXCEPT AS NOTED.

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
23-0462	1	FM/AM-1000/A	1	1	23-0475	SCHEMATIC

APPLICATION — LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .008
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN JNV DATE 10-29-75
CHECKED DATE 10-30-75
APPROVED DATE MD2776

MATERIAL
TREATMENT
FINISH

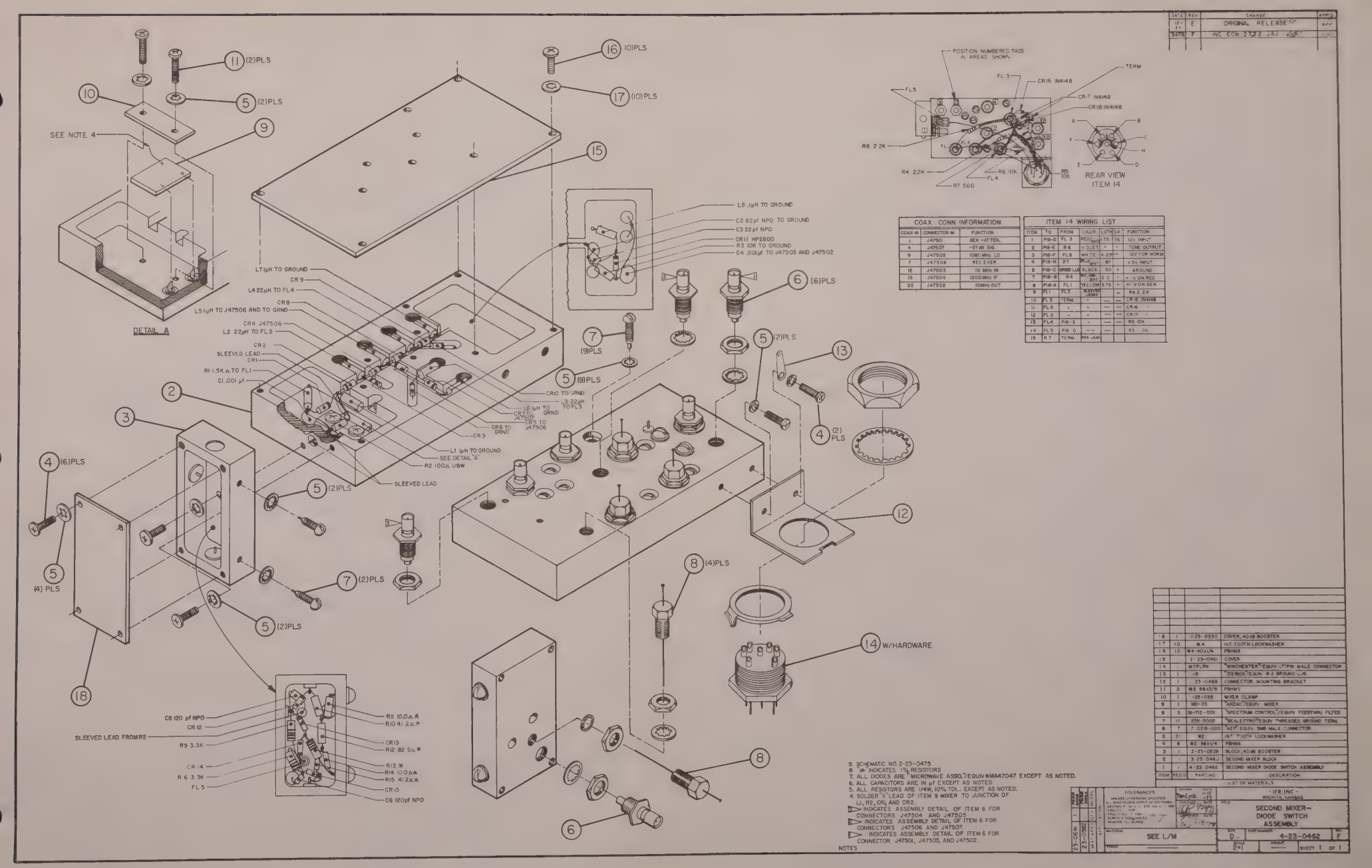
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE: SECOND MIXER-DIODE SWITCH SCHEMATIC FM/AM-1000/A

SIZE B | PART NUMBER 2-23-0475 | REV D

SCALE — WEIGHT — SHEET 1 OF 1

Figure 6-28



DATE	REV	CHANGE	APPR'D
12-17	E	ORIGINAL RELEASE TJ?	
3-78	F	INC ECN 2722 JAJ	

COAX	CONNECTOR ##	FUNCTION
1	J47501	GEN-ATTION,
4	J47507	-57dB BIG.
9	J47508	1080 MHz LO
7	J47506	REC EVER
12	J47503	10 MHz IN
15	J47504	1200 MHz IF
32	J47502	10MHz OUT

ITEM	TO	FROM	COLOR	LGTH	GA	FUNCTION
1	P18-D	FL 3	RED/WHT	3.75	26	12V INPUT
2	P18-E	R6	VIOLET	"	"	TONE OUTPUT
3	P18-F	FL5	WHITE	4.25"	"	12V FOR NORM
4	P18-H	R7	BLUE/WHT	87	"	+5V INPUT
5	P18-C	GRND LUG	BLACK	3.0	"	GROUND
7	P18-B	R4	WHT/BRN	2.0	"	+V ON REC
8	P18-A	FL1	YELLOW	3.75	"	+V ON GEN
9	FL1	FL3	SLEEVED LEAD		—	R8 2.2K
10	FL3	TERM.	"	—	—	CR16 IN4148
11	FL4	"	"	—	—	CR16 "
12	FL2	"	"	—	—	CR17 "
13	FL4	P18-E	"	—	—	R6 10K
14	FL3	P18-D	—	—		R5 10K
16	R7	TERM.	RES LEAD			

ITEM	REQD	PART NO.	DESCRIPTION
			LIST OF MATERIALS
18	1	1-23-0530	COVER, 40dB BOOSTER
17	10	#4	INT TOOTH LOCKWASHER
16	10	#4-40x1/4	PBHMS
15		2-23-0461	COVER
14	1	M7PLRN	"WINCHESTER"/EQUIV 7 PIN MALE CONNECTOR
13	1	18	"ZIERICK"/EQUIV #2 GROUND LUG
12	1	23-0469	CONNECTOR MOUNTING BRACKET
11	2	#2 56x3/8	PBHMS
10	1	-25-038	MIXER CLAMP
9	1	MD-E3	"ANZAC"/EQUIV MIXER
8	5	21-712-001	"SPECTRUM CONTROL"/EQUIV FEEDTHRU FILTER
7	11	229-5002	"SEALECTRO"/EQUIV THREADED GROUND TERM.
6	7	7-0219-000	"AEP"/EQUIV SMB MALE CONNECTOR
5	21	#2	INT TOOTH LOCKWASHER
4	8	#2 56x1/4	PBHMS
3	1	2-23-0529	BLOCK, 40dB BOOSTER
2	1	3-23-0462	SECOND MIXER BLOCK
1	1	4-23-0462	SECOND MIXER DIODE SWITCH ASSEMBLY

NOTES
9. SCHEMATIC NO 2-23-0475
8. ⚠ INDICATES 1% RESISTORS
7. ALL DIODES ARE "MICROWAVE ASSO."/EQUIV #MA47047 EXCEPT AS NOTED.
6. ALL CAPACITORS ARE IN μf EXCEPT AS NOTED
5. ALL RESISTORS ARE 1/4W, 10% TOL. EXCEPT AS NOTED.
4. SOLDER "X" LEAD OF ITEM 9 MIXER TO JUNCTION OF L1, R2, CR1, AND CR2.
3. INDICATES ASSEMBLY DETAIL OF ITEM 6 FOR CONNECTORS J47504 AND J47505.
2. INDICATES ASSEMBLY DETAIL OF ITEM 6 FOR CONNECTORS J47506 AND J47507.
1. INDICATES ASSEMBLY DETAIL OF ITEM 6 FOR CONNECTOR J47501, J47503, AND J47502.

TOLERANCES UNLESS OTHERWISE SPECIFIED
DRAWN Tom Eyck 1-12-77
CHECKED
ENGR APPR
MFG APPR
MATERIAL
FINISH
- HRR INC. - WICHITA, KANSAS

Figure 6-29

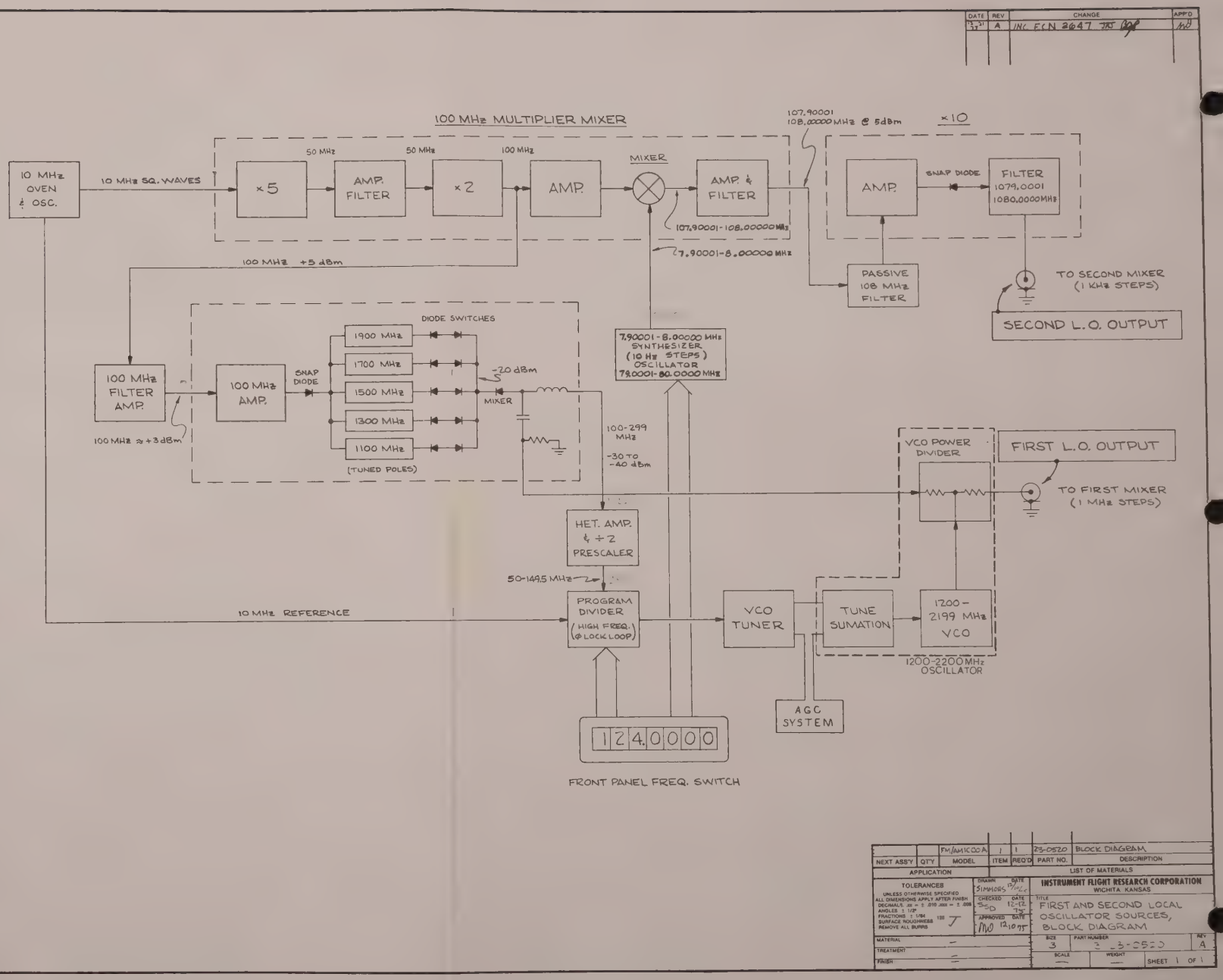
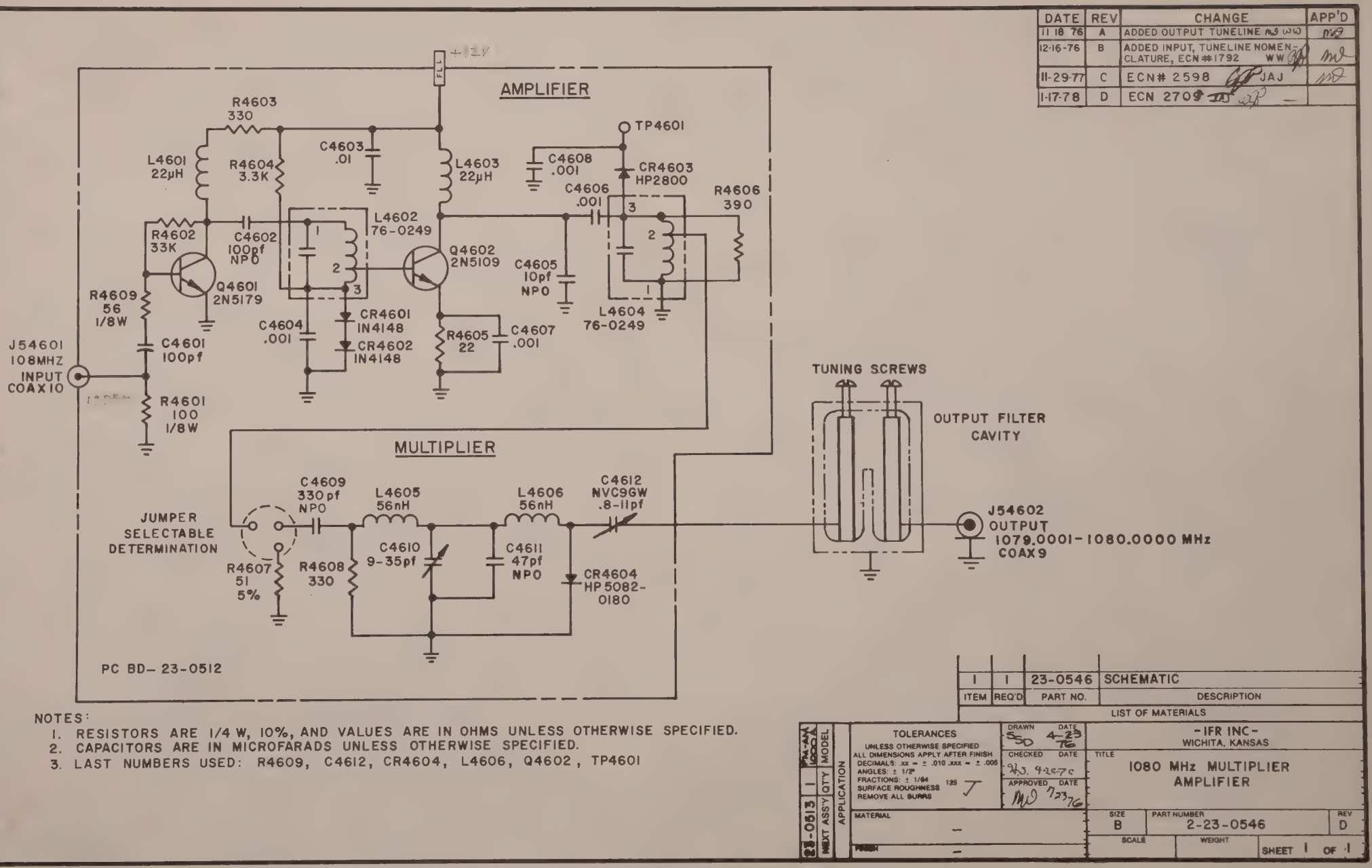

DATE
REV
CHANGE
APP'D
A
INC ECN 3647
100 MHz MULTIPLIER MIXER
10 MHz OVEN & OSC.
10 MHz SQ. WAVES
×5
50 MHz
AMP. FILTER
50 MHz
×2
100 MHz
AMP.
MIXER
AMP. & FILTER
107.90001 108.00000 MHz @ 5dBm
×10
AMP.
SNAP DIODE
FILTER 1079.0001 1080.0000 MHz
107.90001-108.00000 MHz
7.90001-8.00000 MHz
100 MHz +5 dBm
PASSIVE 108 MHz FILTER
TO SECOND MIXER (1 KHz STEPS)
SECOND L.O. OUTPUT
DIODE SWITCHES
1900 MHz
1700 MHz
1500 MHz
1300 MHz
1100 MHz
(TUNED POLES)
-20 dBm
MIXER
7.90001-8.00000 MHz SYNTHESIZER (10 Hz STEPS) OSCILLATOR 79.0001-80.0000 MHz
100 MHz FILTER AMP.
100 MHz ≈ +3 dBm
100 MHz AMP.
SNAP DIODE
100-299 MHz
-30 TO -40 dBm
VCO POWER DIVIDER
FIRST L.O. OUTPUT
TO FIRST MIXER (1 MHz STEPS)
HET. AMP. & ÷2 PRESCALER
50-149.5 MHz
PROGRAM DIVIDER (HIGH FREQ. @ LOCK LOOP)
10 MHz REFERENCE
VCO TUNER
TUNE SUMATION
1200-2199 MHz VCO
1200-2200 MHz OSCILLATOR
AGC SYSTEM
124.0000
FRONT PANEL FREQ. SWITCH
FM/AMICOA
1
1
23-0520
BLOCK DIAGRAM
NEXT ASSY
QTY.
MODEL
ITEM
REQ'D
PART NO.
DESCRIPTION
APPLICATION
LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS
DRAWN
SIMMONS 12/10/74
CHECKED
12-12-74
APPROVED
MD 12/10/74
DATE
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
TITLE
FIRST AND SECOND LOCAL OSCILLATOR SOURCES, BLOCK DIAGRAM
MATERIAL
TREATMENT
FINISH
SIZE
3
PART NUMBER
3-3-0520
REV.
A
SCALE
WEIGHT
SHEET 1 OF 1

Figure 6-30



DATE	REV	CHANGE	APP'D
11 18 76	A	ADDED OUTPUT TUNELINE AS WO	
12-16-76	B	ADDED INPUT, TUNELINE NOMENCLATURE, ECN #1792 WW	
11-29-77	C	ECN# 2598 JAJ	
1-17-78	D	ECN 2709	

NOTES:
1. RESISTORS ARE 1/4 W, 10%, AND VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. LAST NUMBERS USED: R4609, C4612, CR4604, L4606, Q4602, TP4601

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	23-0546	SCHEMATIC

LIST OF MATERIALS

23-0513	1	PM-AM 1000A	MODEL
NEXT ASSY	QTY	APPLICATION	

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

DRAWN SSO DATE 4-23-76
CHECKED WJ 4-27-76 DATE
APPROVED MD 7-23-76 DATE

MATERIAL –
FINISH –

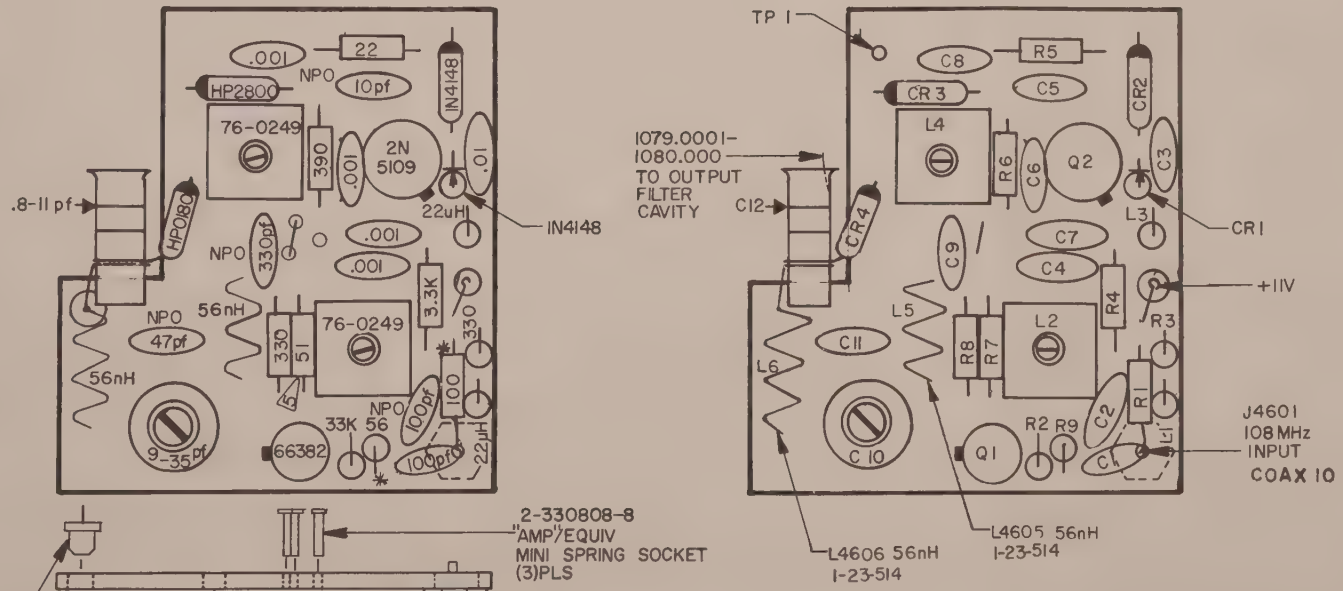
-IFR INC-
WICHITA, KANSAS

TITLE
1080 MHz MULTIPLIER AMPLIFIER

SIZE B | PART NUMBER 2-23-0546 | REV D
SCALE | WEIGHT | SHEET 1 OF 1

Figure 6-31

DATE	REV	CHANGE	APP'D
11-9-77	D	ORIGINAL RELEASE TT	
1-17-78	D-1	INC ECN 2709 JAT	
4-28-79	D-2	INC ECN# 3050	



NOTES

1 ALL RESISTORS ARE 1/4W, 10% TOL. EXCEPT AS NOTED.
2 ALL CAPACITORS ARE IN μf EXCEPT AS NOTED.
3 COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4 MAX. HEIGHT OF COMPONENTS TO BE .53 FROM COMPONENT SIDE OF BOARD.
5 R7 IS 51 OHM, 1/4W, 5% RES.
6 "*" DENOTES 1/8W, 10% RES.
7 COMPONENT DESIGNATORS HAVE 46 PREFIX i.e. R4601, C4601. L4601 etc.
8 SCHEMATIC NO. 2-23-546
9 PC BOARD NO. 1-23-512

2-23-516	1	FM/AM1000A/S				
NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
APPLICATION			LIST OF MATERIALS			

TOLERANCES UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .008
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN TenEyck DATE 11-9-77
CHECKED DATE
APPROVED DATE

MATERIAL
TREATMENT
FINISH

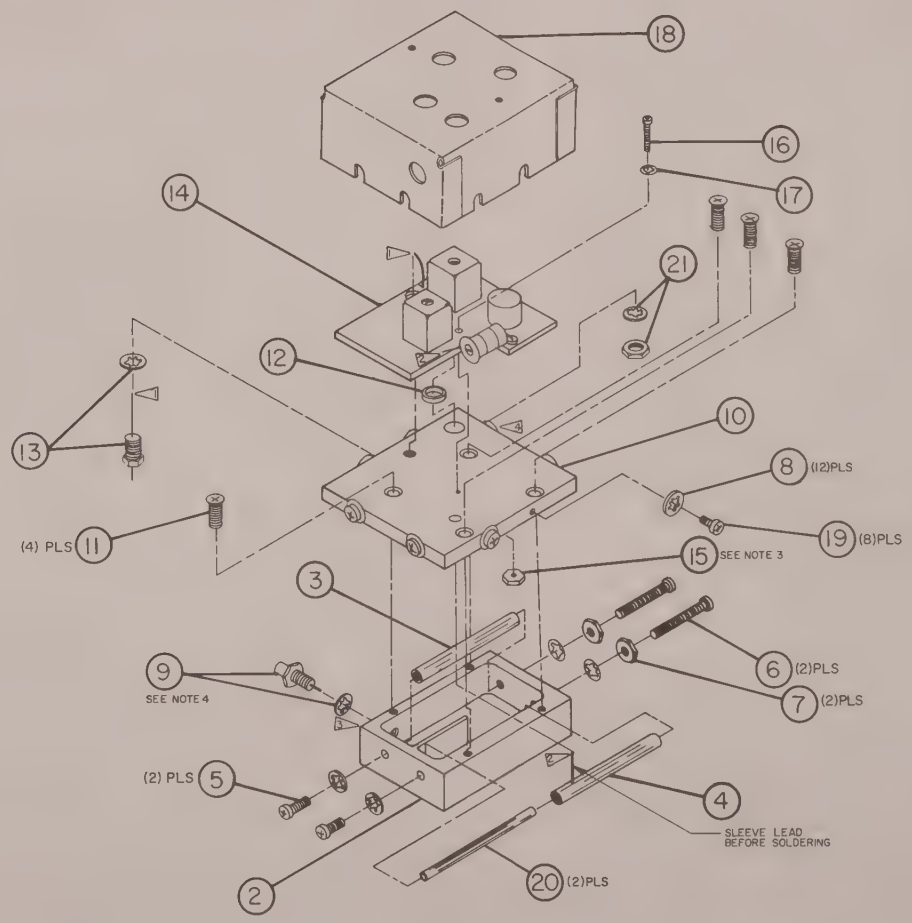
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
1080MHz MULTIPLIER AMPLIFIER
PC BOARD ASSEMBLY

SIZE	PART NUMBER	REV
B	2-23-513	D-2

SCALE 2:1 WEIGHT — SHEET 1 OF 1

Figure 6-32



ITEM	REQD	PART NO.	DESCRIPTION
21	1	———	ITEM 21 PART OF ITEM 14 CONNECTOR HARDWARE
20	2	PCV105/10	"ALPHA"EQUIV 10GA TUBING
19	8	4-40 x 3/16	PBHMS
18	1	3-23 0518	COVER, 1080 MHz MULTIPLIER PC BOARD
17	1	#2	INT TOOTH LOCKWASHER
16	1	#2-56x3/8	PBHMS
15	1	#4-40-32	EXTRA SMALL PATTERN HEX NUT
14	1	1-23 0513	1080MHz MULTIPLIER PC BOARD ASSEMBLY
13	1	5172-00	"SPECTRUM CONTROLS"/EQUIV FILTER
12	1	276-0001-54	SPACER
11	4	4 40x3/8	PFHMS
10	1	2-23-05 7	MOUNTING PLATE 1080 MHz MULTIPLIER PC BD
9	1	17-0219 000	"AEP"/EQUIV SMB MALE CONNECTOR
8	12	#4	INT TOOTH LOCKWASHER
7	2	#4-40	LARGE PATTERN HEX NUT
6	2	#4-40x3/4	PBHMS
5	2	#4-40x3/8	PBHMS
4	1	1-23 0515	TUNING POLE
3	1	1-08 0081	TUNING POLE
2	1	2-08-0100-2	OSCILLATOR MULTIPLIER BLOCK
1	1	3-23-0516	1080 MHz MULTIPLIER ASSEMBLY

LIST OF MATERIALS

5. PLACE NO. 10 ON ITEM 18 COVER NEAR SCREW INDICATED BY
PLACE NO."9" DECAL NEAR ITEM 9 CONNECTOR ON ITEM 2 BLK.
4. ITEM 9 IS SOLDERD INTO ITEM 3 AFTER ITEM 3 IS INSTALLED.
3. ITEM 15 NUT SCREWS TO ITEM 16 SCREW AS INDICATED.
2. SOLDER ITEM 4 LEAD TO ITEM 14 LEAD AS INDICATED BY
1. SOLDER ITEM 13 LEAD TO ITEM 14 LEAD AS INDICATED BY
NOTES

TOLERANCES UNLESS OTHERWISE SPECIFIED

DRAWN TenEyck 11-15-77
CHECKED
APPROVED

- IFR INC -
WICHITA, KANSAS

TITLE
1080MHz MULTIPLIER ASSEMBLY

MATERIAL SEE L/M

SIZE C | PART NUMBER 3-23-0516 | REV A

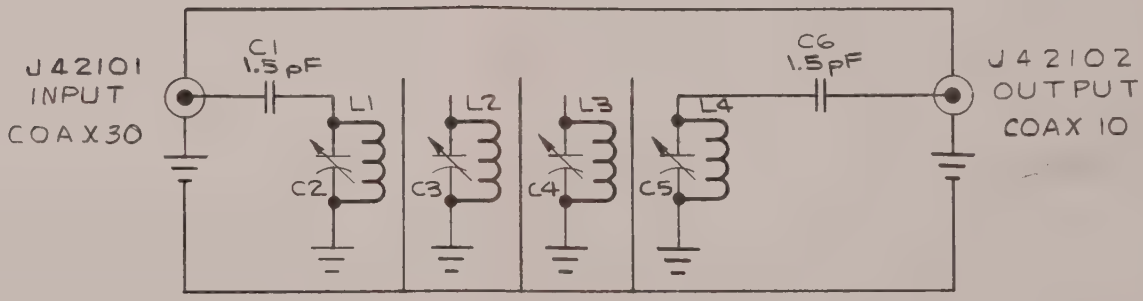
SCALE FI | WEIGHT | SHEET 1 OF 1

FSCM 20064 | MODEL | APP [illegible] | NEXT ASS'Y 23-0641

ORIGINAL RELEASE 11-15-77 A

Figure 6-33

DATE	REV	CHANGE	APP'D
1-17-78	A	INC ECN 2709 JAS	WW



NOTES:

1. C2 THRU C5 ARE VC2GG "JFD"/EQUIV. TRIMMER CAPS.
2. L1 THRU L4 ARE 9 TURNS #22 GUAGE ENAMEL COATED COPPER WIRE WOUND ON 7/16 DIA. COIL FORMS PLACED AROUND C2 THRU C5.

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
	1	FM/AM-1000	1	1	23-0421	108 MHz FILTER SCHEM.

APPLICATION | LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN JNV DATE 5/21/75
CHECKED DATE
APPROVED DATE

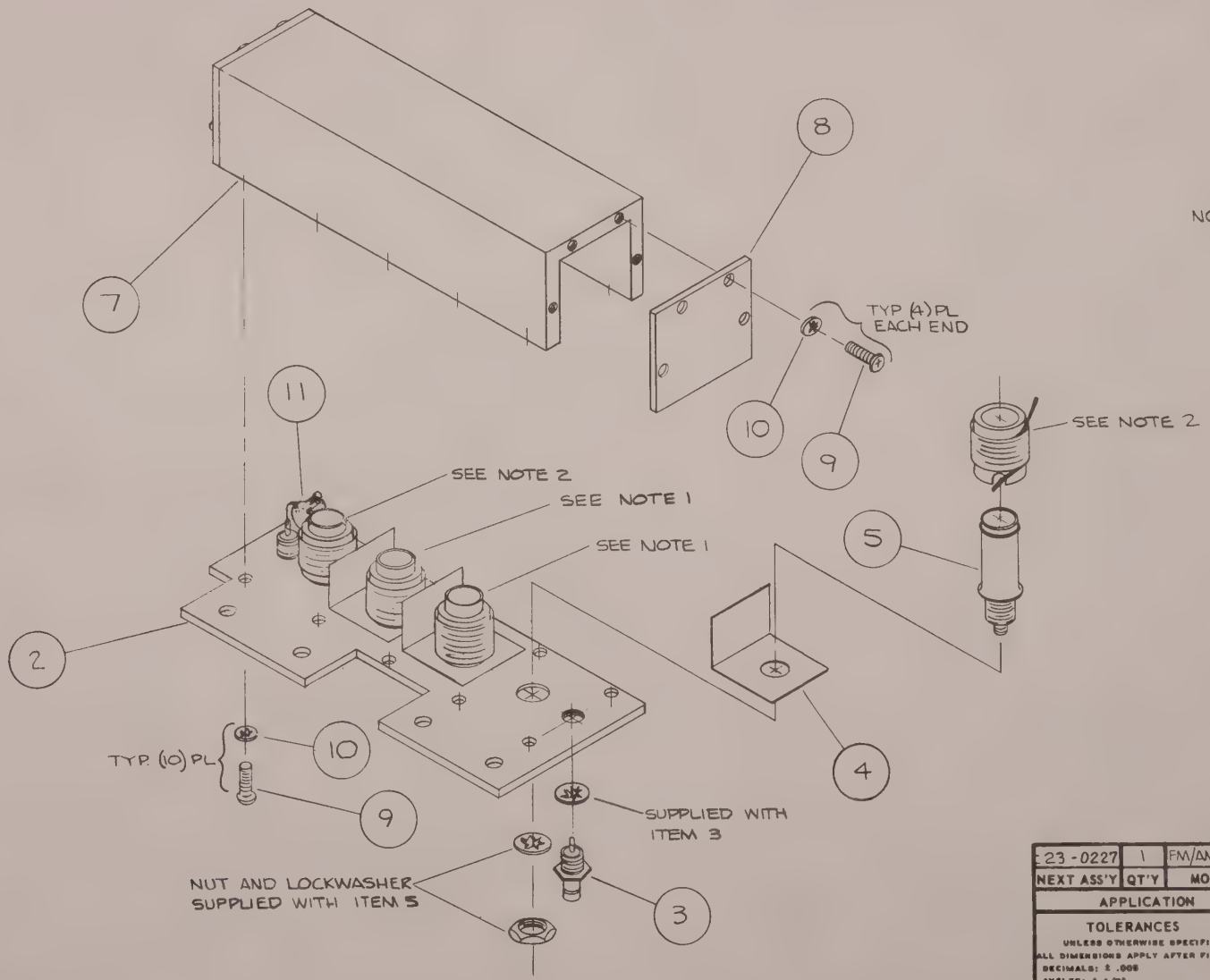
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS.

TITLE
108 MHz FILTER
SCHEMATIC
FM/AM-1000

MATERIAL —
TREATMENT —
FINISH —

SIZE | PART NUMBER 1-23-0421 | REV A
SCALE — | WEIGHT — | SHEET 1 OF 1

Figure 6-34



DATE	REV	CHANGE	APP'D
[illegible]	A	INCORP ECN # 729 JNV MP	MP
10/18/77	B	INCORP. ECN # 2483 LC	MP

NOTES:

1. WIND 10 TURNS #22 AWG ENAMEL COATED COPPER WIRE AROUND ITEM 6 (COIL FORM). CONNECT ONE END TO GROUND END OF ITEM 5 (CAP) AND CONNECT OPPOSITE END OF COIL TO LEAD AT UPPER END OF CAP. COAT WINDING WITH "Q-DOPE" OR SIMILAR MAT'L. CARE MUST BE TAKEN THAT ALL COILS IN EACH UNIT ARE WOUND IN A UNIFORM DIRECTION.
2. WIND THIS COIL PER NOTE 1 WITH (8) TURNS #22 AWG ENAMEL COATED COPPER WIRE.

ITEM	REQ'D	PART NO.	DESCRIPTION
11	2	DM05-020D	"ARCO"/EQUIV. 2.0 pF CAP
10	18	#2	INT TOOTH LOCKWASHER
9	18	#2-56X1/4	PBHMS
8	2	23-0400	END PLATE
7	1	23-0398	HOUSING BLOCK
6	4	23-0397	COIL FORM
5	4	VC26G	"JFD" EQUIV TRIMMER CAP
4	3	23-0399	RF BAFFLE
3	2	5158-0208-09	"AMERICON"/EQUIV CONN
2	1	23-0401	TOP COVER
1	1	23-0402	FILTER ASS'Y

NEXT ASS'Y	QT'Y	MODEL
23-0227	1	FM/AM-1000

APPLICATION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN JNV DATE 4-11-75
CHECKED MP DATE 9 11 75
APPROVED MP DATE 4 11 75

MATERIAL SEE ABOVE
TREATMENT —
FINISH —

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
108 MHz
BANDPASS FILTER ASS'Y
FM/AM-1000

SIZE | PART NUMBER 2-23-0402 | REV B
SCALE 1:1 | WEIGHT — | SHEET 1 OF 1

Figure 6-35

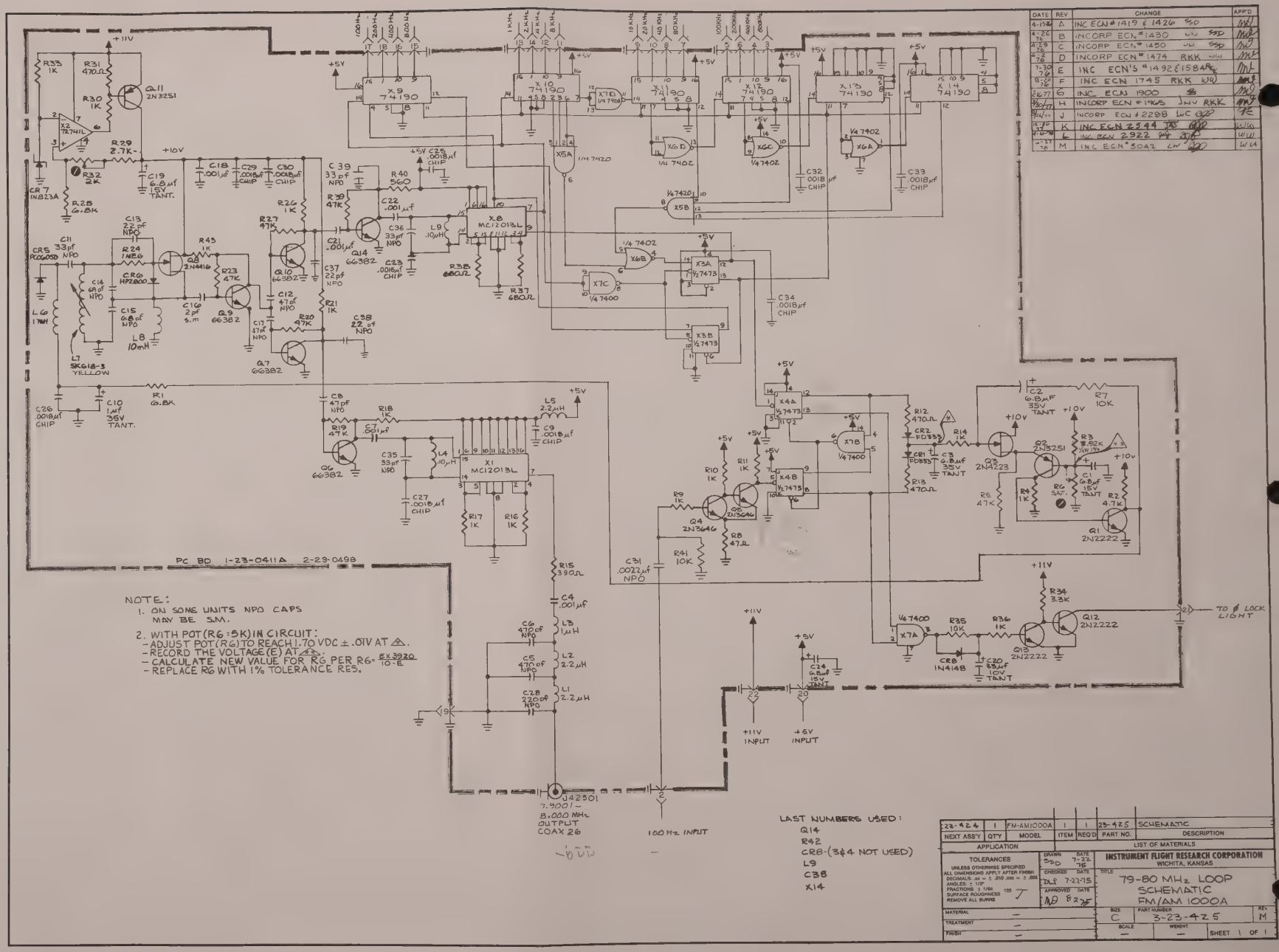
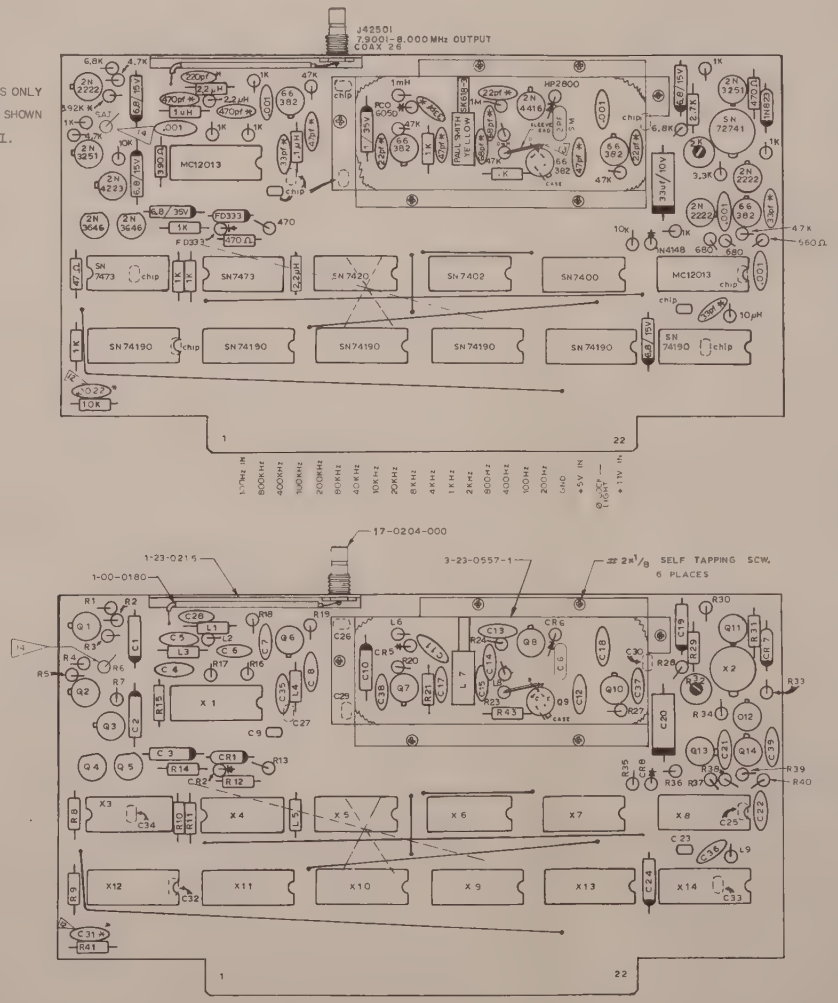

PC BD 1-23-0411A 2-23-0498
NOTE:
1. ON SOME UNITS NPO CAPS MAY BE S.M.
2. WITH POT(R6 :5K)IN CIRCUIT:
- ADJUST POT(R6)TO REACH 1.70 VDC ± .01V AT ⚠.
- RECORD THE VOLTAGE(E) AT ⚠.
- CALCULATE NEW VALUE FOR R6 PER R6= EX3320 / 10-E
- REPLACE R6 WITH 1% TOLERANCE RES.
LAST NUMBERS USED:
Q14
R42
CR8-(3$4 NOT USED)
L9
C36
X14
J42501
7.900 / ~ 8.000 MHz OUTPUT COAX 26
100 Hz INPUT
+11V INPUT
+5V INPUT
TO ϕ LOCK LIGHT
DATE REV CHANGE APPD
A INC ECN#1419 & 1426 SSD
B INCORP ECN#1430 SSD
C INCORP ECN#1450 SSD
D INCORP ECN#1474 RKK
E INC ECN'S #1492 & 1584
F INC ECN 1745 RKK
G INC ECN 1900
H INCORP ECN#1965 JNV RKK
J INCORP ECN#2208 LWC
K INC ECN 2344
L INC ECN 2922
M INC ECN#3042 LWC
23-424 1 FM-AM1000A 1 1 23-425 SCHEMATIC
NEXT ASSY QTY MODEL ITEM REQ'D PART NO. DESCRIPTION
APPLICATION LIST OF MATERIALS
INSTRUMENT FLIGHT RESEARCH CORPORATION WICHITA, KANSAS
TITLE 79-80 MHz LOOP SCHEMATIC FM/AM 1000A
SIZE C PART NUMBER 3-23-425 REV M
SCALE — WEIGHT — SHEET 1 OF 1

Figure 6-36

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN μF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.
5. PLACE CHIP CAPACITORS ON BACK SIDE OF BOARD, UNLESS SHOWN ON FRONT
6. * NOTES NPO CAP
7. BROKEN LINES NOTE COMPONENTS OR JUMPERS ON BACK OF BOARD
8. SCHEMATIC No. 3-23- 425
9. PARTS LIST No. 1-23- 424
10. PC No. 2-23- 498
11. ALL CHIP CAPS ARE .0018 μf
12. NPO NECESSARY BECAUSE OF ENCLOSURE SPACE LIMITATIONS ONLY
13. BEND LEAD OF RES. ON BACK OF BD. & SOLDER TO POSITION SHOWN
14. REFERENCE PROCEDURE No. 1-34- 031 PART B, PARAGRAPH II.



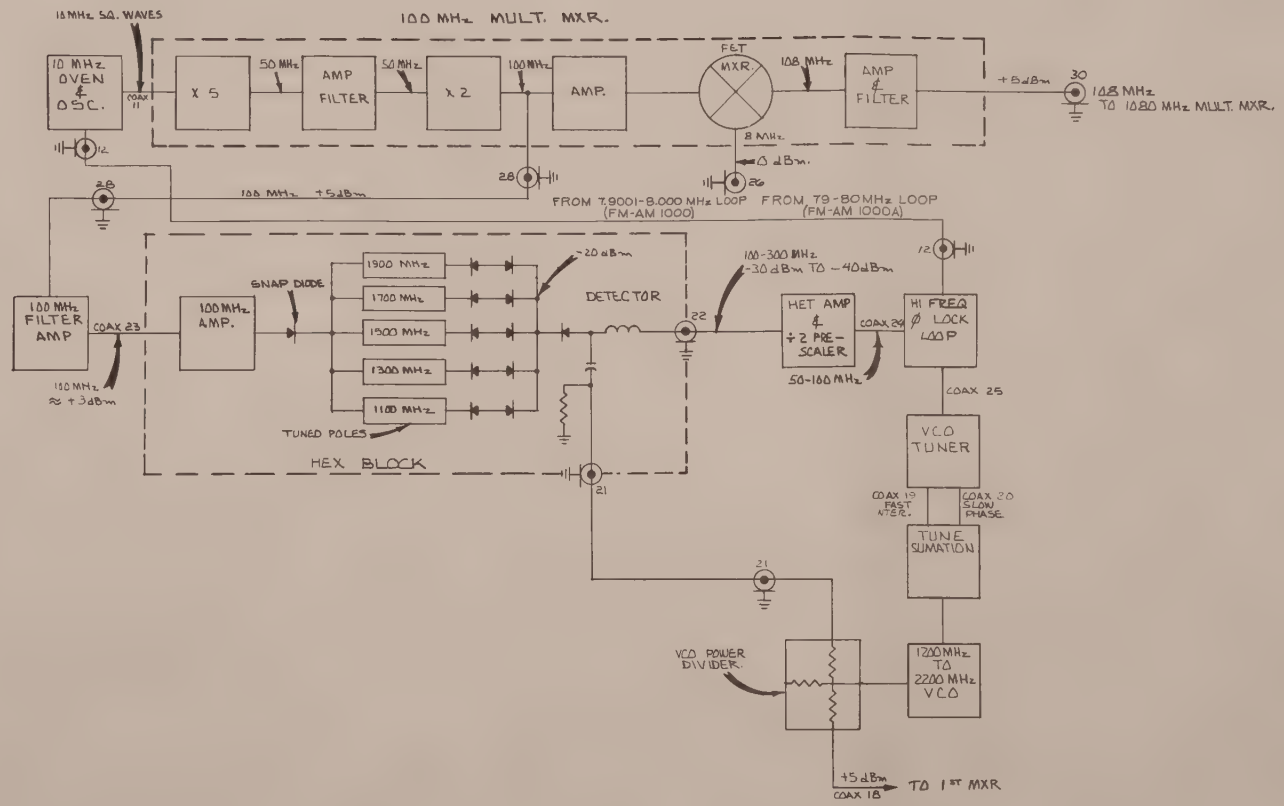
	L	INC ECN 2544
	M	INC ECN 2922
	N	INC ECN 3042

79 80 MHz LOOP ASS'Y. DRAWING

D 4-23- 424 N

2 x 1

Figure 6-37



DATE	REV	CHANGE	APP'D

NEXT ASS'Y	QTY	MODEL	ITEM	REQ'D	PART NO.	DIAGRAM DESCRIPTION

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx = ± .010 .xxx = ± .005
ANGLES ± 1°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN — DATE 8-21-74
CHECKED — DATE
APPROVED — DATE

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

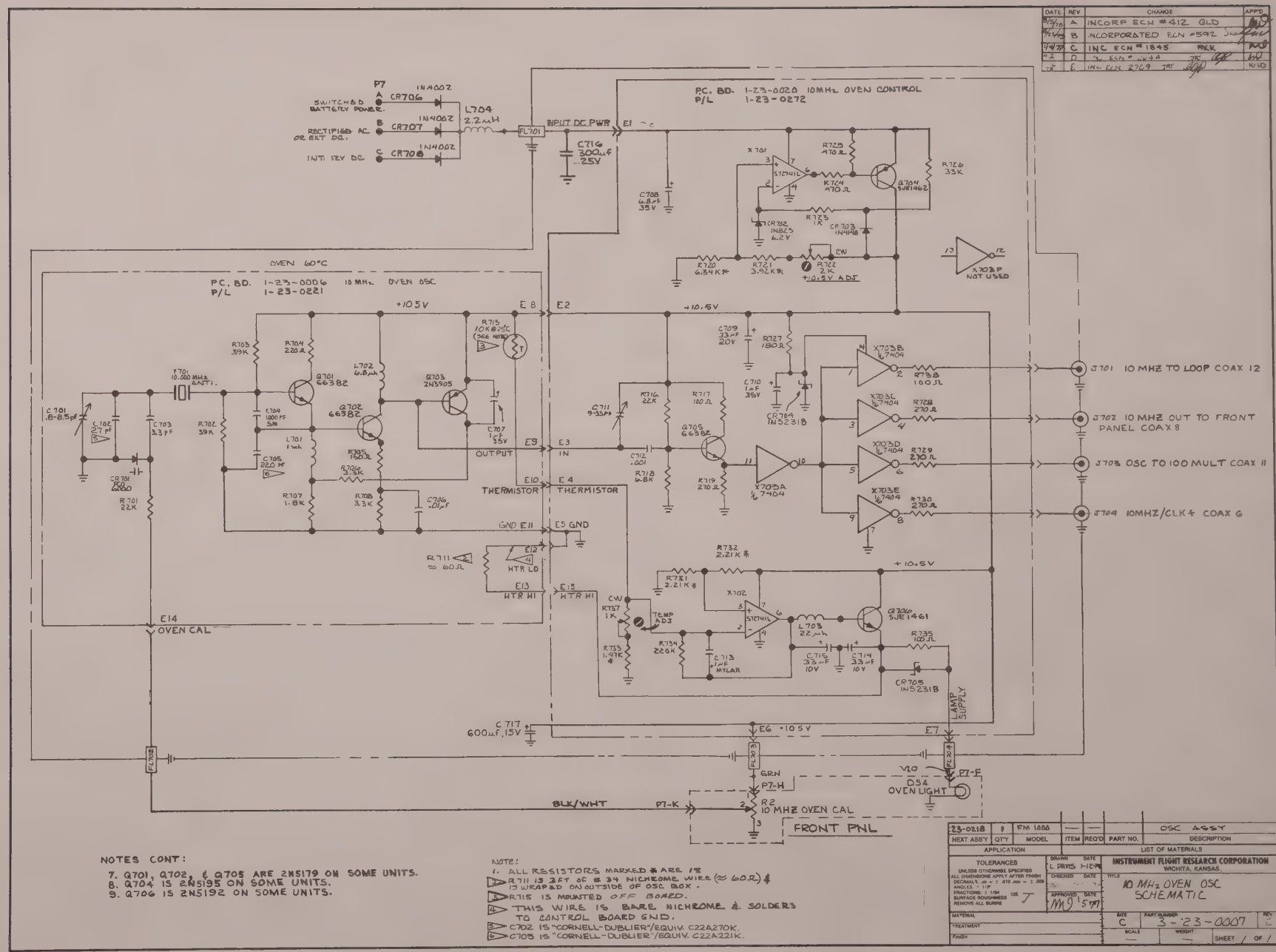
TITLE: BLOCK DIAGRAM— HI FREQ PHASE LOCK LOOP

MATERIAL
TREATMENT
FINISH

SIZE: J — PART NUMBER: 3-23-0327 — REV

SCALE — WEIGHT — SHEET 1 OF 1

Figure 6-38



NOTES CONT:

7. Q701, Q702, & Q705 ARE 2N5179 ON SOME UNITS.
8. Q704 IS 2N5195 ON SOME UNITS.
9. Q706 IS 2N5192 ON SOME UNITS.

NOTE:

1. ALL RESISTORS MARKED * ARE 1%
   - A: R711 IS 2 FT OF #34 NICHROME WIRE (≈ 60Ω) & IS WRAPPED ON OUTSIDE OF OSC BOX.
   - A: R715 IS MOUNTED OFF BOARD.
   - A: THIS WIRE IS BARE NICHROME & SOLDERS TO CONTROL BOARD GND.
   - A: C702 IS "CORNELL-DUBLIER"/EQUIV. C22A270K.
   - A: C705 IS "CORNELL-DUBLIER"/EQUIV. C22A221K.

DATE	REV	CHANGE	APPD
9/5/68	A	INCORP ECN #412 GLD	
7/14/69	B	INCORPORATED ECN #592	
11/4/71	C	INC ECN #1845 RWK	
4/2	D	INC ECN #1944	
2/8	E	INC ECN 2269	

23-0218	1	FM 1000	—	—		OSC ASSY
NEXT ASSY	QTY	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION

APPLICATION — LIST OF MATERIALS

TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DECIMALS .XX = ± .010 .XXX = ± .005. ANGLES = 1/2°. FRACTIONS = 1/64. SURFACE ROUGHNESS REMOVE ALL BURRS. 125

DRAWN L. PRYS 1-12-67 — CHECKED — APPROVED MM 9/5/71

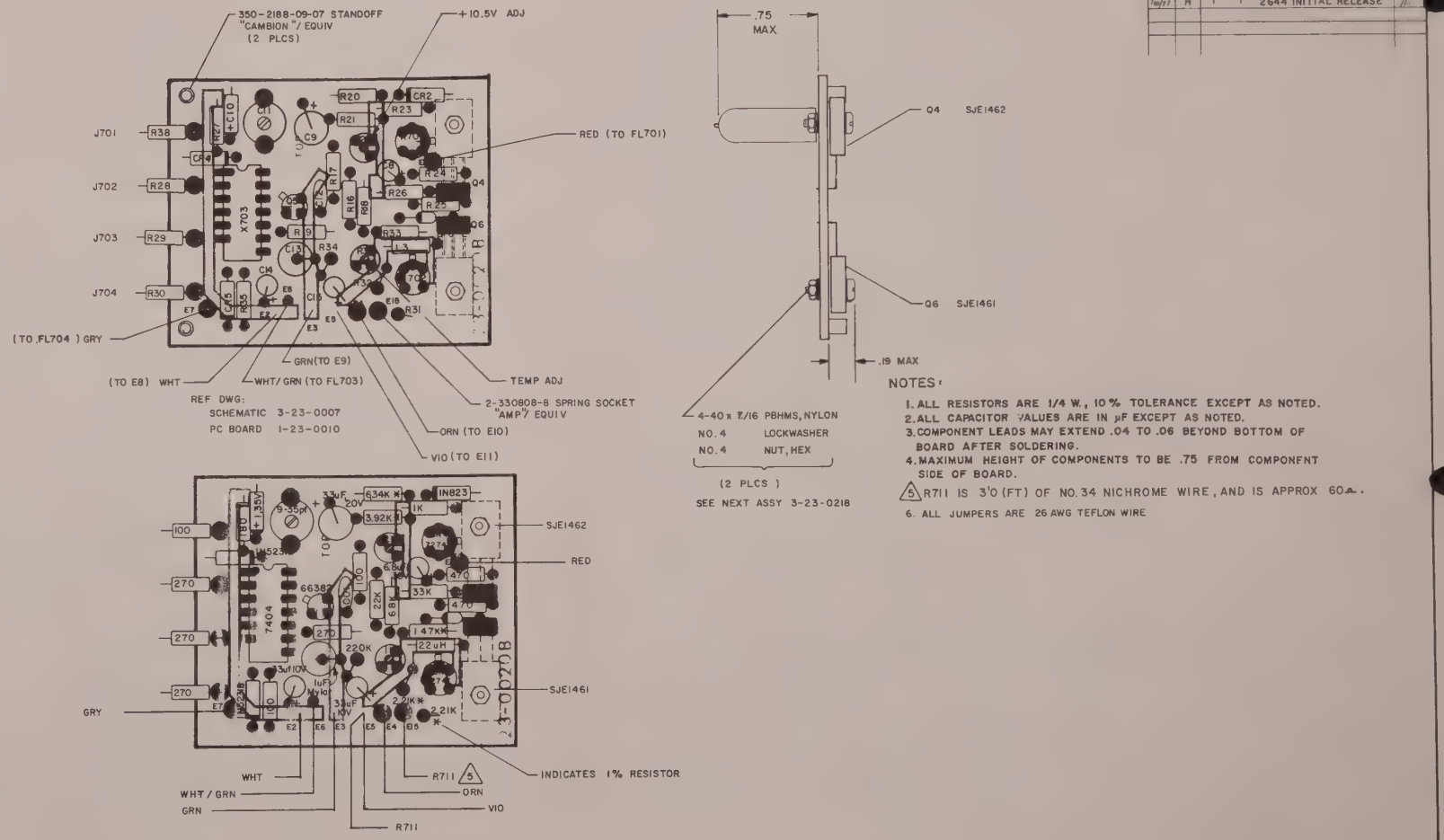
INSTRUMENT FLIGHT RESEARCH CORPORATION, WICHITA, KANSAS.

TITLE: 10 MHz OVEN OSC. SCHEMATIC

MATERIAL — TREATMENT — FINISH

SIZE C — PART NUMBER 3-23-0007 — REV E — SCALE — WEIGHT — SHEET / OF /

Figure 6-39



NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN μF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .75 FROM COMPONENT SIDE OF BOARD.
5. R711 IS 3'0 (FT) OF NO. 34 NICHROME WIRE, AND IS APPROX 60Ω.
6. ALL JUMPERS ARE 26 AWG TEFLON WIRE

DATE	REV	CHANGE	APP'D
9/25/74	A	INC ECN 1 LD	
12/27/74	B	2 LD	
3/10/75	C	410 JNV	
11/10/76	D	1131 SSD	
4/19/77	E	1845 RKK	
9/14/77	F	2020 TJT	
6/21/78	G	2078 TJT	
7/10/81	H	2644 INITIAL RELEASE	

ITEM	REQ'D	PART NO	DESCRIPTION
1	1	1-23-0272	ASSY P/L

LIST OF MATERIALS

NEXT ASSY	23-0218	DRAWN	4/22/77
QTY	1	CHECKED	
MODEL		APPROVED	
APPLICATION			

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

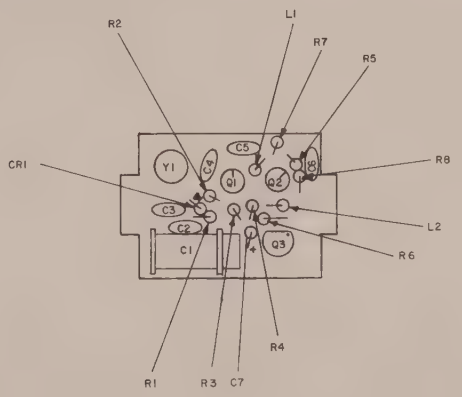
MATERIAL —
FINISH —

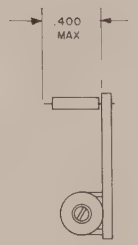
-IFR INC-
WICHITA, KANSAS

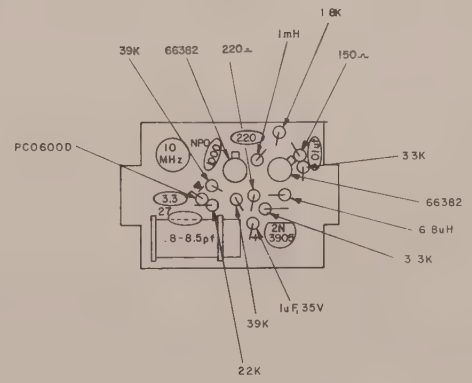
TITLE
10MHz OVEN CONTROL
PC BOARD ASSY
FM/AM-1000

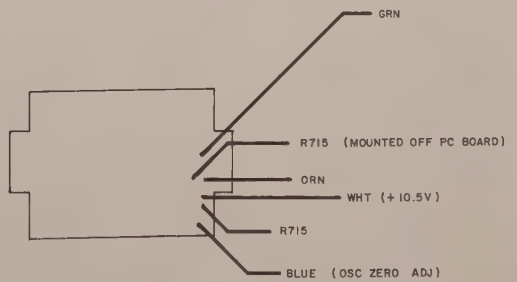
SIZE C | PART NUMBER 3-23-0272 | REV H
SCALE 2/1 | WEIGHT — | SHEET OF 1

Figure 6-40









DATE	REV	CHANGE	APP'D

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN pF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .40 FROM COMPONENT SIDE OF BOARD.
5. REFERENCE DWG:
   PC BOARD 1-23-0006
   SCHEMATIC 3-23-0007

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	1-23-0221	ASSY

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN DATE 4/26/77
CHECKED DATE
APPROVED DATE 5/2/77

-IFR INC-
WICHITA, KANSAS

TITLE
10 MHz OVEN OSCILLATOR
PC BOARD ASSY
FM / AM 1000

MATERIAL
FINISH

SIZE C | PART NUMBER 3-23-0221 | REV
SCALE | WEIGHT | SHEET OF

NEXT ASSY | QTY | MODEL
APPLICATION

Figure 6-41

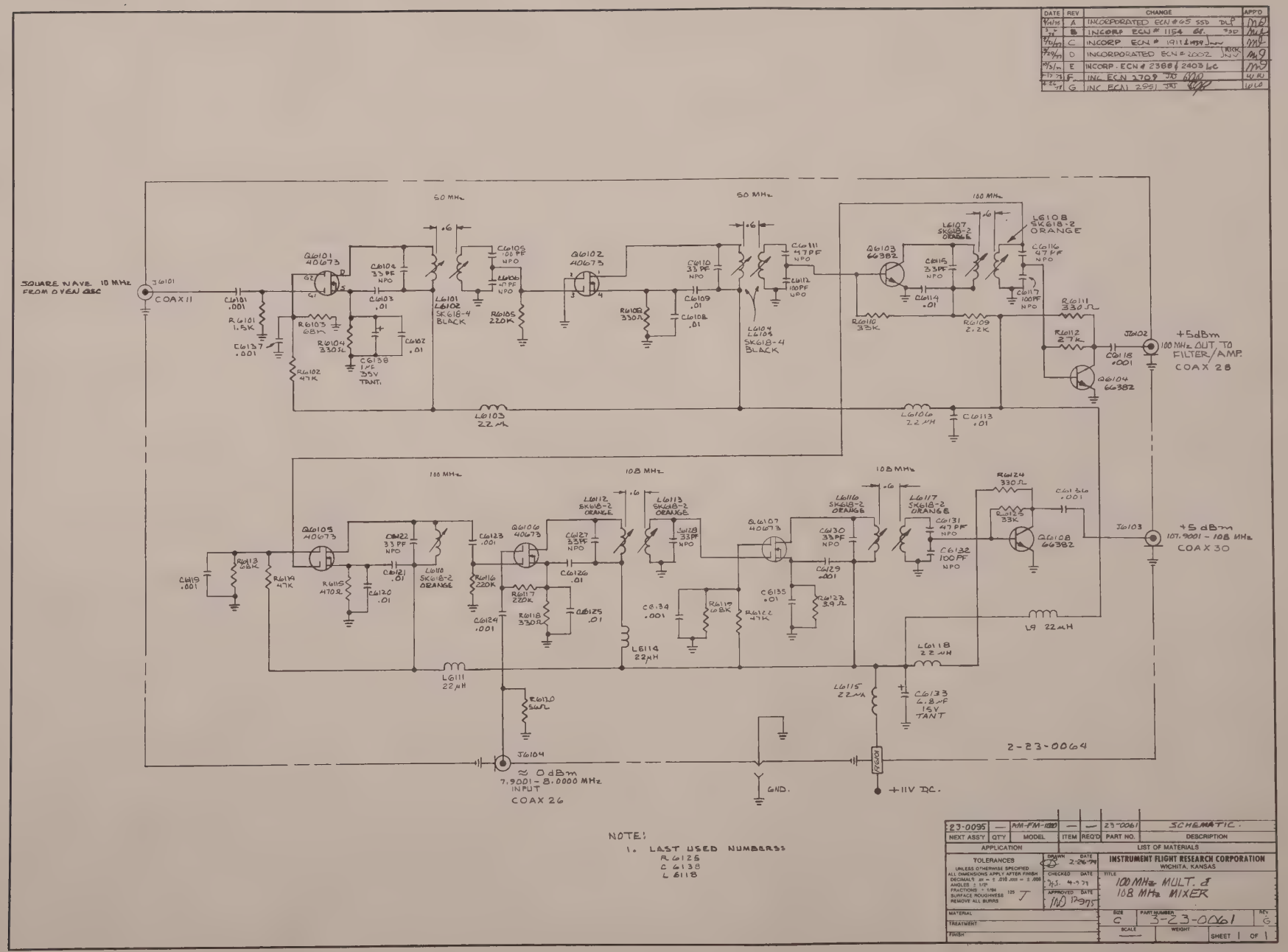
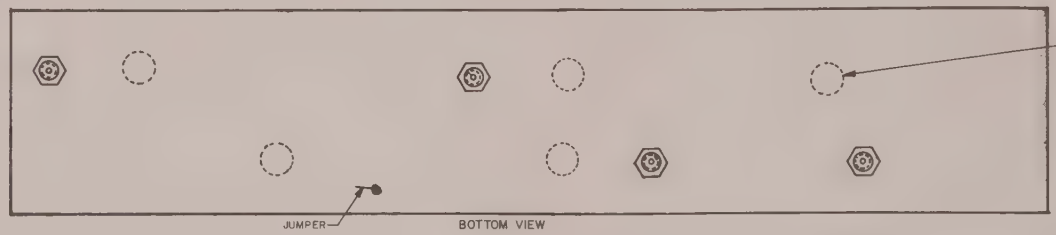
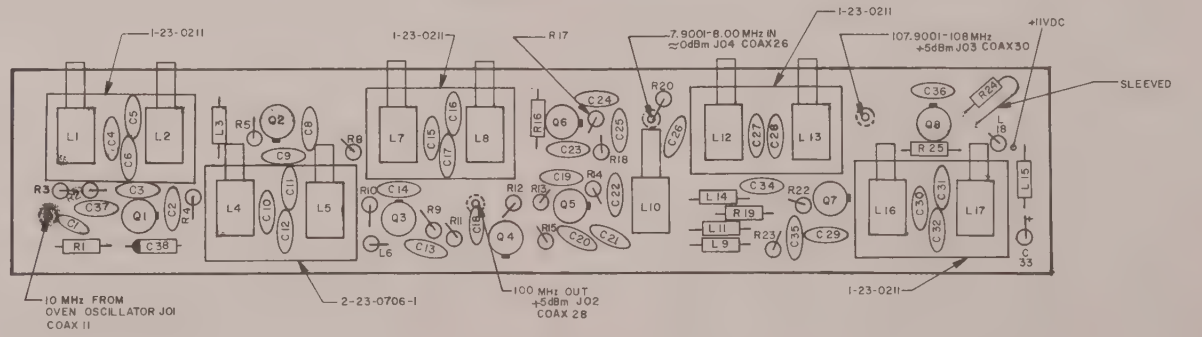
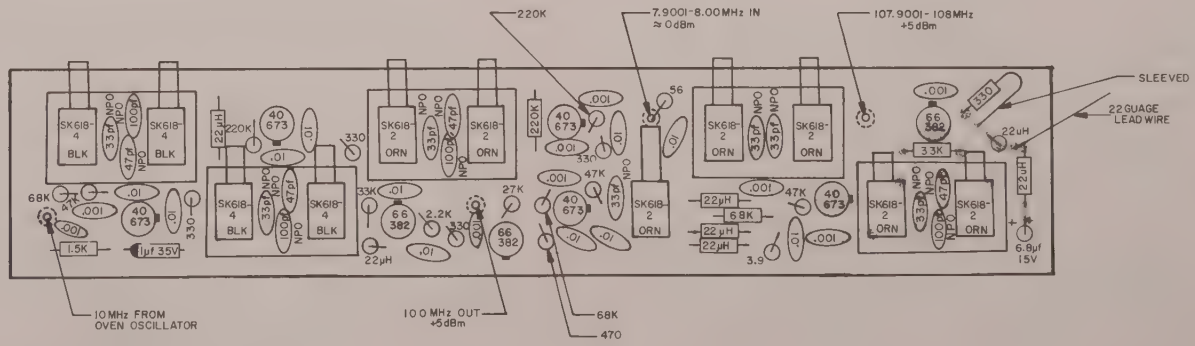

DATE | REV | CHANGE | APP'D
A | INCORPORATED ECN #65 SSD DLP
B | INCORP ECN # 1154 GR. SSD
C | INCORP ECN # 1911 & 1939 JNV
D | INCORPORATED ECN # 2002 JNV
E | INCORP. ECN # 2388 & 2403 LG
F | INC ECN 2709 JRD
G | INC ECN 2951 JRD
SQUARE WAVE 10 MHz FROM OVEN OSC
J6101
COAX 11
50 MHz
100 MHz
108 MHz
Q6101 40673
Q6102 40673
Q6103 6638Z
Q6104 6638Z
Q6105 40673
Q6106 40673
Q6107 40673
Q6108 6638Z
L6101 L6102 SK618-4 BLACK
L6103 22 µH
L6104 L6105 SK618-4 BLACK
L6107 SK618-2 ORANGE
L6108 SK618-2 ORANGE
L6110 22 µH
L6111 22 µH
L6112 SK618-2 ORANGE
L6113 SK618-2 ORANGE
L6114 22µH
L6115 22 µH
L6116 SK618-2 ORANGE
L6117 SK618-2 ORANGE
L6118 2.2 µH
L9 22 µH
J6102
+5dBm
100 MHz OUT TO FILTER/AMP.
COAX 28
J6103
+5 dBm
101.9001 - 108 MHz
COAX 30
J6104
≈ 0dBm
7.9001 - 8.0000 MHz
INPUT
COAX 26
GND.
+11V DC.
2-23-0064
NOTE:
1. LAST USED NUMBERS:
R 6126
C 6138
L 6118
23-0095 — AM-FM-108 — — 23-0061 SCHEMATIC
NEXT ASSY | QTY | MODEL | ITEM | REQ'D | PART NO. | DESCRIPTION
APPLICATION
LIST OF MATERIALS
TOLERANCES
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
DRAWN DATE 2-26-79
CHECKED DATE 4-9-79
APPROVED DATE 4-19-79
TITLE 100 MHz MULT. & 108 MHz MIXER
SIZE C
PART NUMBER 23-0061
REV G
SCALE
WEIGHT
SHEET 1 OF 1

Figure 6-42

DATE	REV	CHANGE	APP'D
9-14-77	C	ORIGINAL RELEASE TJT	
4-25-78	J-1	INC ECN 2709	
	J-2	INC ECN 2951	
8-2-78	K	INC. ECN 2954 & 2999 TenEyck	







NOTE:

1. ALL RESISTORS ARE 1/4 W, 10% TOL. EXCEPT AS NOTED.
2. ALL CAPACITORS ARE IN µf EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIM HEIGHT OF COMPONENTS TO BE .45 FROM COMPONENT SIDE OF BOARD.
5. ALL COMPONENT CALL OUTS ARE PREFIXED WITH 61 I.e. C6102, R6102

P.C. BOARD 2-23-0064
SCHEMATIC 3-23-0061

ITEM	REQ'D	PART NO.	DESCRIPTION
			LIST OF MATERIALS

NEXT ASSY	QTY	MODEL
23-0219	1	
23-0219	1	

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

MATERIAL
FINISH

DRAWN TENEYCK 8-14-77
CHECKED
APPROVED

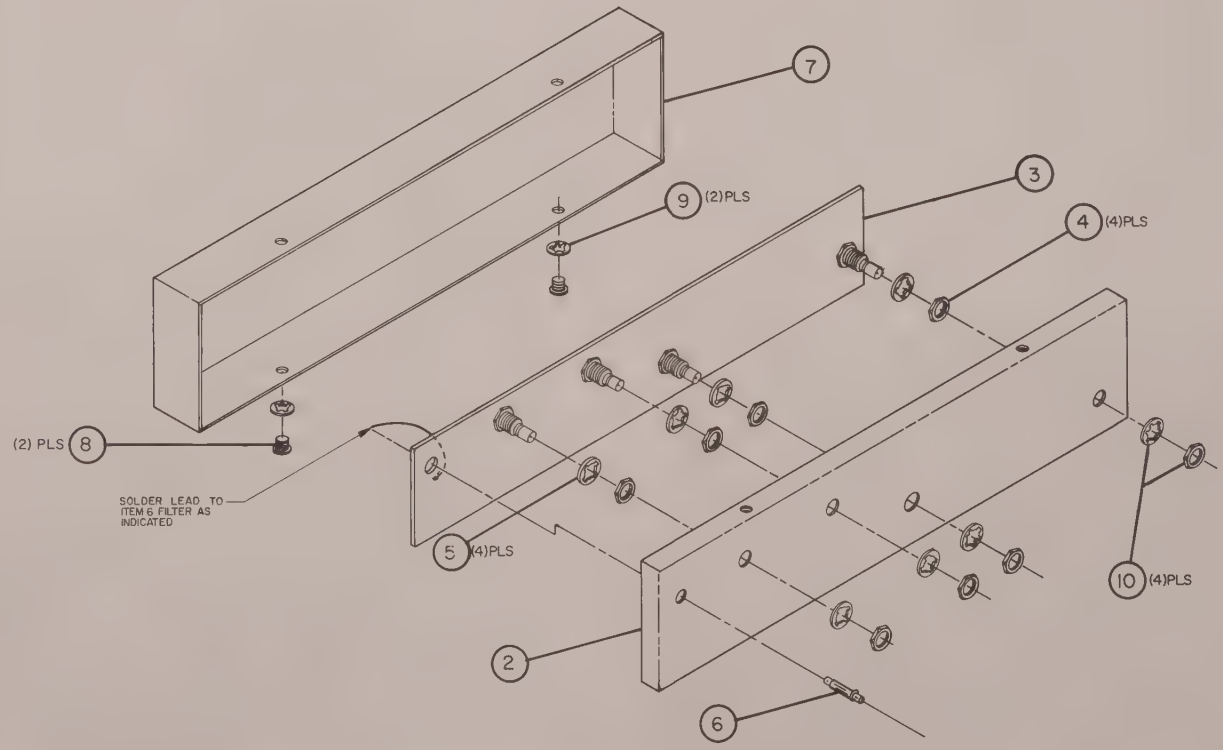
-IFR INC-
WICHITA, KANSAS

TITLE
100MHz MULTIPLIER AND
108MHz MIXER
PC BOARD ASSEMBLY

SIZE C | PART NUMBER 3-23-0095 | REV K
SCALE 2:1 | WEIGHT | SHEET 1 OF 1

Figure 6-43

DATE	REV	CHANGE	APP'D
11-2-77	C	ORIGINAL RELEASE TT	



ITEM	REQ'D	PART NO.	DESCRIPTION
10	2	——	ITEM 10 NOW PART OF ITEM 3 CONNECTORS
9	2	#4	INT TOOTH LOCKWASHER
8	2	#4-40 x 1/8	PBHMS
7	1	3-23-0151-2	100MHz AMP & 108MHz PC BD. COVER
6	1	51-708-001	"SPECTRUM CONTROLS/EQUIV FILTER
5	4	#10	INT TOOTH LOCKWASHER
4	4	#10-32	EXTRA SMALL PATTERN HEX NUT
3	1	1-23-0095	100MHz AMP & 108MHz PC BD ASSEMBLY
2	1	3-23-0151-1	100MHz AMP & 108MHz PC BD. ENCLOSURE
1	1	3-23-0219	100MHz AMP & 108MHz MIXER ASSEMBLY

LIST OF MATERIALS

DRAW ING NO.	23-0492		
MODEL			
QTY	1		
NEXT ASSY			
APPLICATION			

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN TenEyck DATE 11-2-77
CHECKED DATE
APPROVED DATE

MATERIAL
FINISH

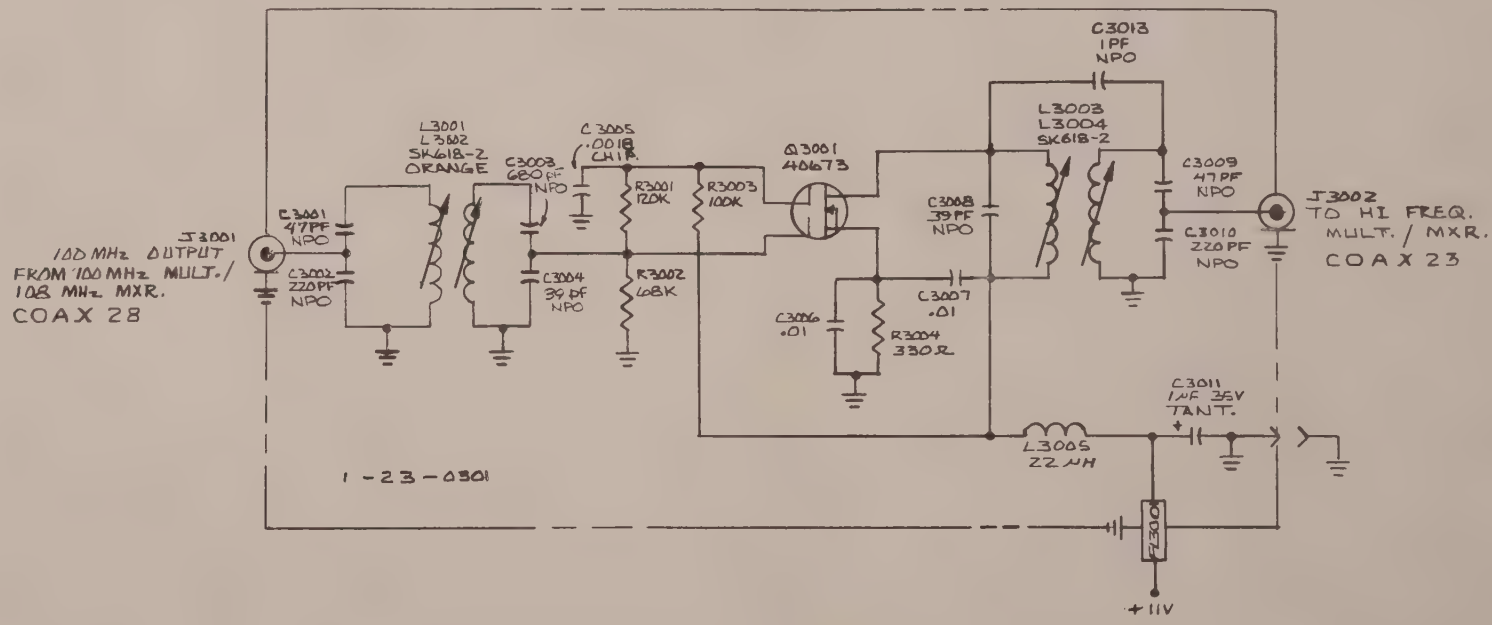
- IFR INC -
WICHITA, KANSAS

TITLE: 100MHz AMP & 108MHz MIXER ASSEMBLY

SIZE C | PART NUMBER 3-23-0219 | REV C
SCALE FULL | WEIGHT | SHEET 1 OF 1

Figure 6-44

DATE	REV	CHANGE	APP'D
2-14-75	A	INCORPORATED ECN # 291	
9-5-75	B	INCORPORATED ECN # 983	
3-29-77	C	INCORP. ECN # 1958	
1-18-78	D	INC ECN 2709	



1-23-0301
ARTWORK

23-0303	—	FM-100D	1	1	09-0300	SCHEMATIC
NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 √
REMOVE ALL BURRS

DRAWN — DATE 7-25-74
CHECKED — DATE 7-25-74
APPROVED — DATE 12 12 75

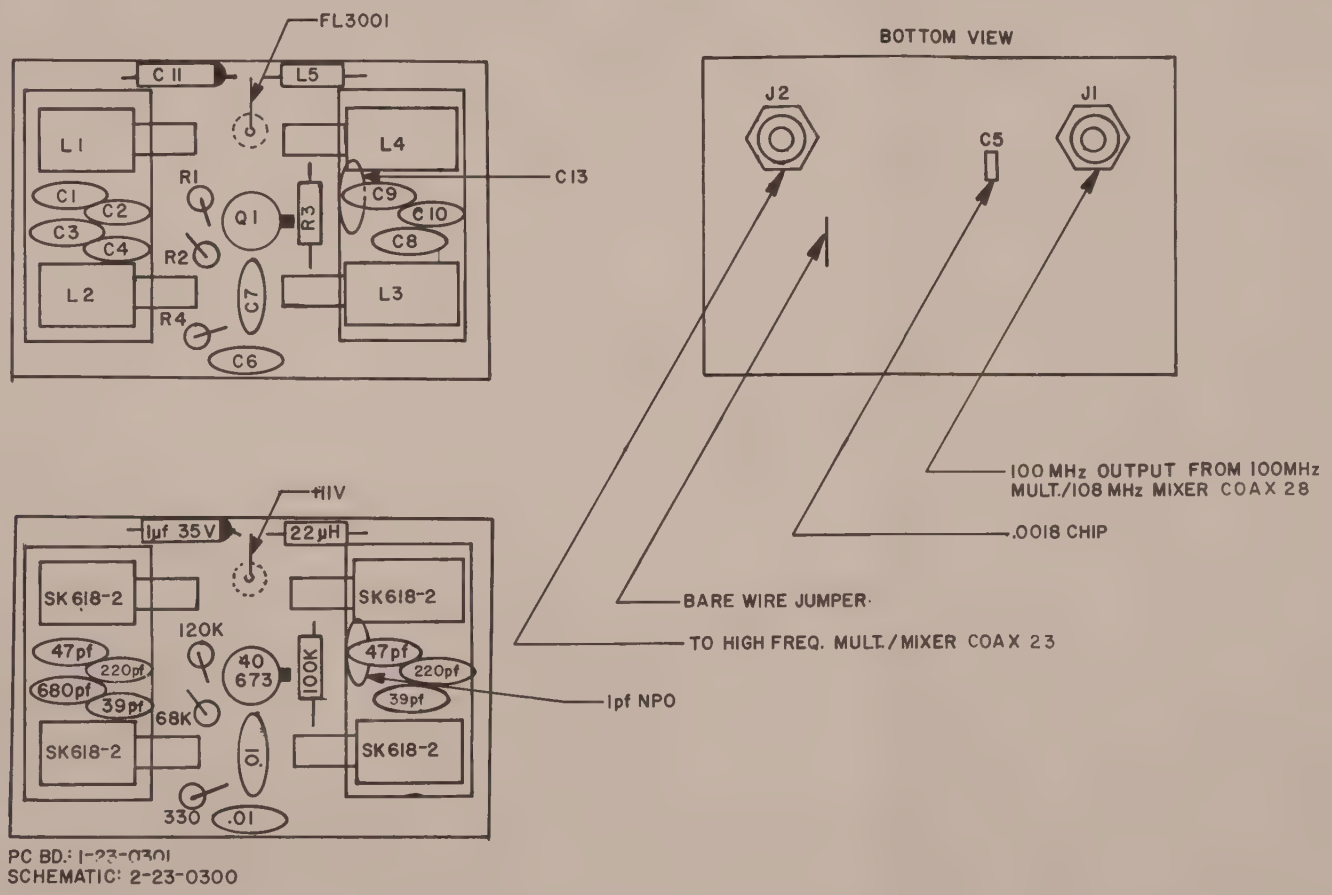
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE: 100MHz FILTER SCHEMATIC FM-1000

MATERIAL —
TREATMENT —
FINISH —

SIZE B | PART NUMBER 2-23-0300 | REV D
SCALE — | WEIGHT — | SHEET 1 OF 1

Figure 6-45



PC BD.: 1-23-0301
SCHEMATIC: 2-23-0300

DATE	REV	CHANGE	APP'D
8-22-77	D	ORIGINAL RELEASE TJT	
1-18-78	G	INC ECN 2709 JAT	WW

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN µF EXCEPT AS NOTED, AND ARE NPO.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.
5. PLACE CHIP CAPACITORS ON BACK SIDE OF BOARD.
6. ALL COMPONENT DESIGNATORS HAVE 300 PREFIX; i.e. R3001, Q3001, etc.

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
23-0591	1	FM/AM1000S				
23-0591	1	FM/AM1000A				

APPLICATION — LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN TJT DATE 8/22/77
CHECKED DATE
APPROVED DATE

MATERIAL
TREATMENT
FINISH

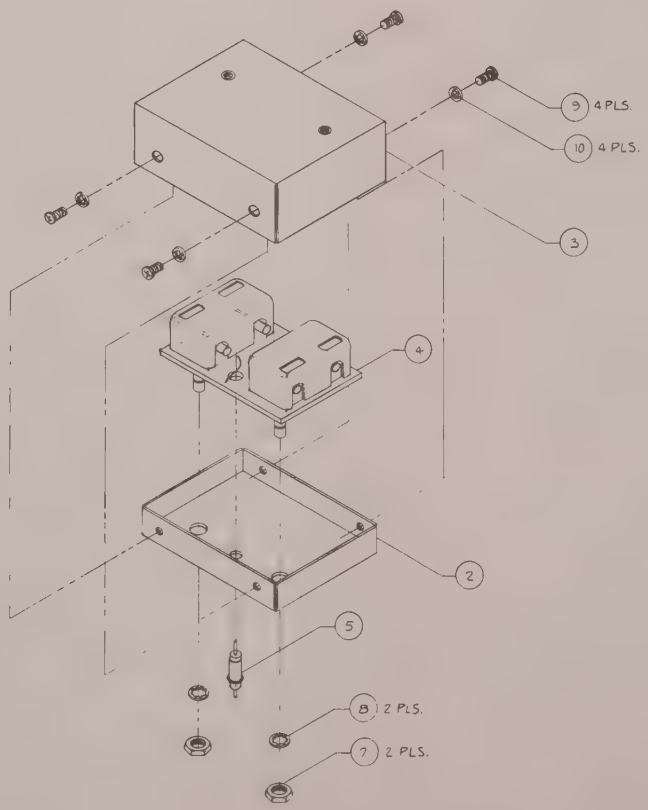
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE: 100 MHz FILTER PC BOARD ASSEMBLY

SIZE B | PART NUMBER 2-23-0303 | REV G
SCALE 2:1 | WEIGHT — | SHEET 1 OF 1

Figure 6-46

DATE	REV	CHANGE	APP'D
12/14/77	C	ORIGINAL RELEASE	MD



ITEM	REQ'D	PART NO	DESCRIPTION
10	4	#4	INT. TOOTH LOCKWASHER
9	4	#4-40 x 3/16	PBHMS
8	2	#10	INT. TOOTH LOCKWASHER
7	2	#10-32	EXTRA SMALL PATT. HEX-NUT
5	1	51-708-001	FEEDTHRU FILTER "SPECTRUM CONTL"
4	1	1-23-0303	00 MHz FILT. BD ASSY
3	1	2230592-2	HOUSING COVER
2	1	2-23-0592	HOUSING BASE
1	1	1-23-0591	100 MHz FILTER ASS'Y

LIST OF MATERIALS

PHASE LOCK MODEL	
NEXT ASSY	QTY 1
APPLICATION	123-0578

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES = 1/2°
FRACTIONS = 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN DATE 12/12/77
CHECKED DATE
APPROVED DATE 12/14/77

MATERIAL
FINISH

-IFR INC-
WICHITA, KANSAS

TITLE
100 MHz FILTER ASSY.

SIZE	PART NUMBER	REV
C	3-23-0591	C

SCALE 1:1 WEIGHT SHEET 1 OF 1

Figure 6-47

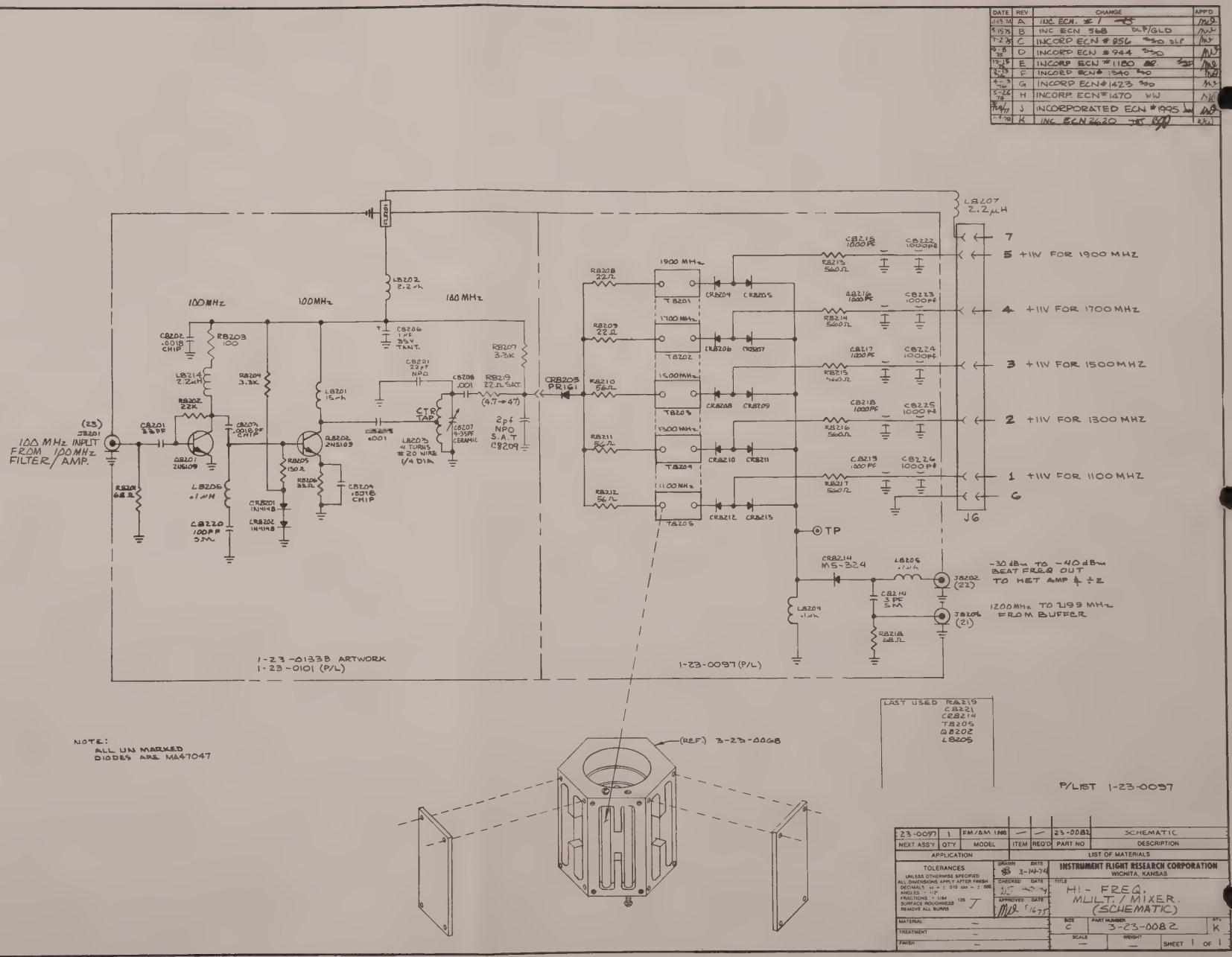
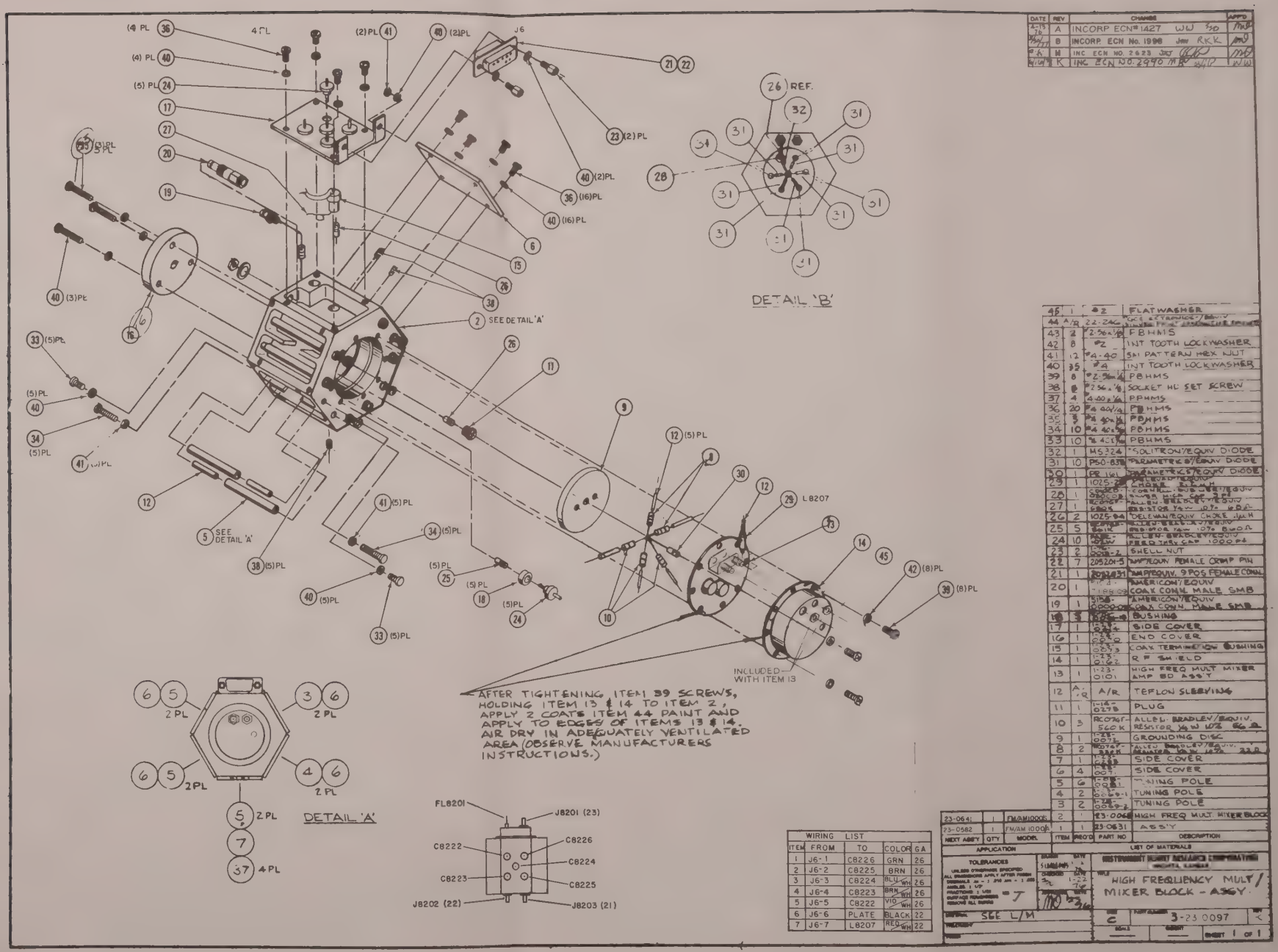

100 MHz INPUT FROM 100 MHz FILTER/AMP.
(23) J8201
100MHz
100MHz
100 MHz
1900 MHz
1700 MHz
1500MHz
1300 MHz
1100 MHz
+11V FOR 1900 MHz
+11V FOR 1700 MHz
+11V FOR 1500MHz
+11V FOR 1300 MHz
+11V FOR 1100 MHz
TP
-30 dBm TO -40 dBm BEAT FREQ OUT TO HET AMP 1 ÷ 2
1200MHz TO 1199 MHz FROM BUFFER
J6
1-23-0133B ARTWORK
1-23-0101 (P/L)
1-23-0097 (P/L)
NOTE:
ALL UN MARKED DIODES ARE MA47047
(REF) 3-23-0008
LAST USED R8219
C8221
C8214
TB205
Q8202
L8205
P/LIST 1-23-0097
HI-FREQ. MULT./MIXER. (SCHEMATIC)
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
3-23-0082
SCHEMATIC
SHEET 1 OF 1

Figure 6-48


DETAIL 'B'
DETAIL 'A'
SEE DETAIL 'A'
L8207
INCLUDED WITH ITEM 13
AFTER TIGHTENING ITEM 39 SCREWS, HOLDING ITEM 13 & 14 TO ITEM 2, APPLY 2 COATS ITEM 44 PAINT AND APPLY TO EDGES OF ITEMS 13 & 14. AIR DRY IN ADEQUATELY VENTILATED AREA (OBSERVE MANUFACTURERS INSTRUCTIONS.)
FL8201
J8201 (23)
C8226
C8224
C8225
C8223
C8222
J8202 (22)
J8203 (21)

DATE	REV	CHANGE	APPD
2-15-72	A	INCORP ECN# 1427 WJ 350	
10/6/77	B	INCORP ECN No. 1998 Jan R.K.K.	
6-6	M	INC ECN NO. 2623 JRT	
4/24/79	K	INC ECN NO. 2990 MR 4/4/17	

ITEM	QTY	PART NO	DESCRIPTION
46	1	#2	FLATWASHER
44	A/R	22-240	PAINT
43	2	2-56 x 1/8	PBHMS
42	8	#2	INT TOOTH LOCKWASHER
41	12	#4-40	5/8 PATTERN HEX NUT
40	35	#4	INT TOOTH LOCKWASHER
39	8	#2-56 x 1/4	PBHMS
38	8	#2-56 x 1/4	SOCKET HD SET SCREW
37	4	4-40 x 1/4	PBHMS
36	20	#4-40 x 1/2	PBHMS
35	3	#4-40 x 3/4	PBHMS
34	10	#4-40 x 5/8	PBHMS
33	10	#4-40 x 3/8	PBHMS
32	1	MS324	SOLITRON/EQUIV DIODE
31	10	P50-83	PARMETRICS/EQUIV DIODE
30	1	PR 161	PARAMETRICS/EQUIV DIODE
29	1	1025-2	CHOKE 2.2uH
28	1	5082-2800	DIODE HI-BAND SW SPST
27	1	6BK5	TUBE RF AMP
26	2	1025-94	DELEVAN/EQUIV CHOKE 1mH
25	5	681K	RESISTOR 1/4W 10% 680Ω
24	10	50V	CERAMIC DISC CAP 1000 pf
23	2	5008-2	SHELL NUT
22	7	205204-5	AMP/EQUIV FEMALE CRIMP PIN
21	1	206231	AMP/EQUIV 9 POS FEMALE CONN
20	1	31-RFR-50	AMERICONT/EQUIV COAX CONN MALE SMB
19	1	5008-2	AMERICONT/EQUIV COAX CONN MALE SMB
18	3	1-233-0244	BUSHING
17	1	1-233-0244	SIDE COVER
16	1	1-233-0250	END COVER
15	1	0273	COAX TERMINATION BUSHING
14	1	1-233-0252	R F SHIELD
13	1	1-233-0101	HIGH FREQ MULT MIXER AMP BD ASS'T
12	A/R		A/R TEFLON SLEEVING
11	1	1-233-0278	PLUG
10	3	RC07GF-560K	ALLEN BRADLEY/EQUIV RESISTOR 1/4W 10% 56Ω
9	1	1-233-0275	GROUNDING DISC
8	2	RC07GF-331K	ALLEN BRADLEY/EQUIV RESISTOR 1/4W 10% 330Ω
7	1	1-233-0243	SIDE COVER
6	4	1-233-0277	SIDE COVER
5	6	1-233-0261	TUNING POLE
4	2	1-233-0261-1	TUNING POLE
3	2	1-233-0261-2	TUNING POLE
2	1	23-0068	HIGH FREQ MULT MIXER BLOCK
1	1	23-0631	ASS'Y

NEXT ASSY	QTY	MODEL
23-0641	1	FM/AM1000S
23-0582	1	FM/AM 1000A

APPLICATION

LIST OF MATERIALS

TOLERANCES

INSTRUMENTATION LABORATORY CORPORATION WICHITA, KANSAS

DRAWN SIMMONS 1-22

CHECKED

ENGINEER

MFG

TITLE: HIGH FREQUENCY MULT/MIXER BLOCK - ASSY.

MATERIAL SEE L/M

SIZE C

PART NUMBER 3-23 0097

REV K

SCALE

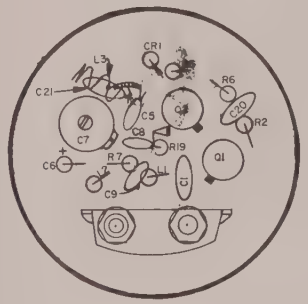
WEIGHT

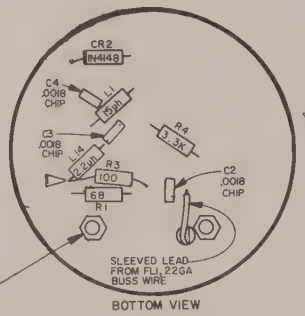
SHEET 1 of 1

WIRING LIST				
ITEM	FROM	TO	COLOR	GA
1	J6-1	C8226	GRN	26
2	J6-2	C8225	BRN	26
3	J6-3	C8224	BLU WH	26
4	J6-4	C8223	BRN WH	26
5	J6-5	C8222	VIO WH	26
6	J6-6	PLATE	BLACK	22
7	J6-7	L8207	RED WH	22

Figure 6-49

DATE	REV	CHANGE	APP'D
12-20-77	E	ORIGINAL RELEASE	
1-17-78	J-1	INC ECN 2709	
6-5-78	R	INC ECN 2991 TenEyck	





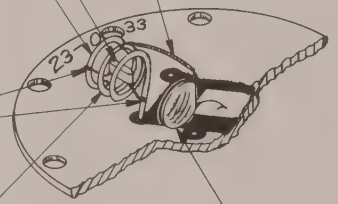
#2-56 SM. PATT. HEX NUT (2) PLS

BOTTOM VIEW

SPACING BETWEEN WINDINGS OF COIL TO BE .06 MAX.

SOLDER SLEEVED LEAD TO TOP OF CENTER COIL AS SHOWN. LEAD LENGTH SHOULD BE MINIMAL (LEAD LENGTH SHOWN IS ENLARGED FOR DRAWING CLARITY).

C21 22pf NPO

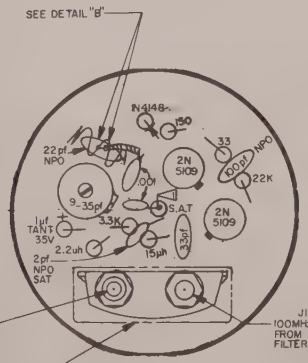


SOLDER CAPACITOR LEADS TO COIL AS INDICATED. CAPACITOR SHOULD NOT TOUCH INSIDE OF COIL, NOR SHOULD THE COIL TOUCH THE PC BD. GROUND PLANE.

L3 COIL 3 TURNS 20GA WIRE 1/4 DIA.

C5 .001μf

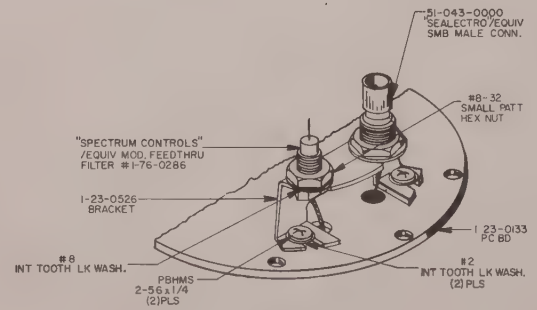
DETAIL B



FL1 TO J6-7

J1 100MHz INPUT FROM 100MHz FILTER COAX 23

SEE DETAIL "A"



DETAIL A

NOTES:

8. NOTE 4 DOES NOT APPLY TO COMPONENTS SHOWN IN DETAIL A.
7. "⊥" INDICATES LEADS OF MINIMUM LENGTH.
6. SCHEMATIC NO. 3-23-0082.
5. MAX. HEIGHT OF COMPONENTS TO BE .37 FROM COMPONENT SIDE OF BOARD AND .15 FROM BOT SIDE OF BD.
4. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
3. COMPONENT DES. HAVE 82 PREFIX i.e. C8201, L8201 etc.
2. ALL CAPACITORS ARE IN μf EXCEPT AS NOTED.
1. ALL RESISTORS ARE 1/4W, 10% TOL. EXCEPT AS NOTED.

ITEM	REQ'D	PART NO.	DESCRIPTION

LIST OF MATERIALS

FROM ASSY	NEXT ASSY	APPLICATION
23-0641	23-0682	

MODEL: 1 | 1 | 1

TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DEC MAT'L ±x = ; .010 .xxx = ; .005. ANGLES = 1/2°. FRACTIONS = 1/64. SURFACE ROUGHNESS 125. REMOVE ALL BURRS.

DRAWN: TenEyck 12-20-77 | CHECKED | APPROVED

- IFR INC - WICHITA, KANSAS

TITLE: HIGH FREQUENCY MULTIPLIER MIXER AMPLIFIER P. C. BOARD ASSEMBLY

MATERIAL | Finish

SIZE: C | PART NUMBER: 23-0101 | REV: R

SCALE: 2:1 | WEIGHT | SHEET 1 OF 1

Figure 6-50

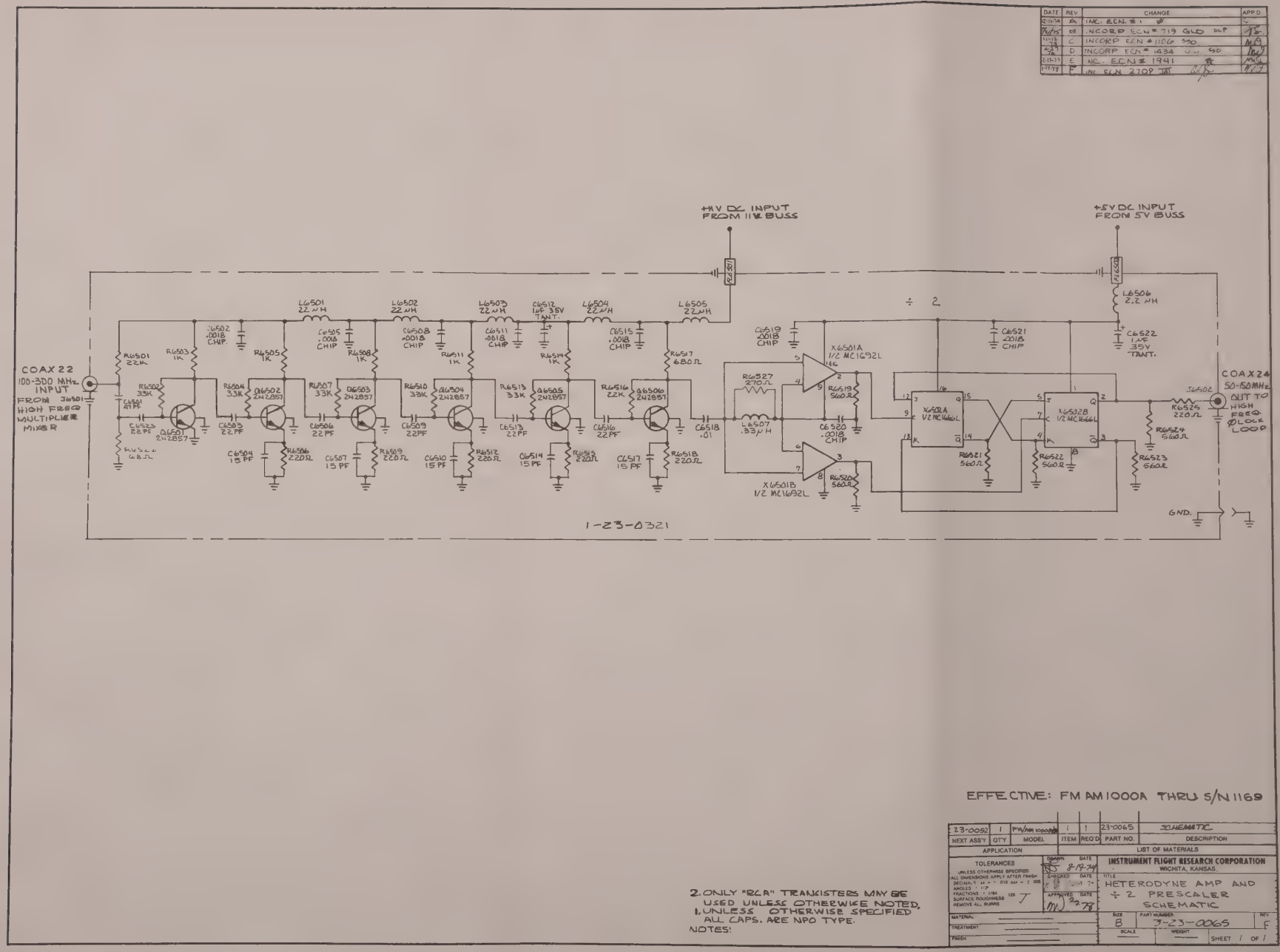
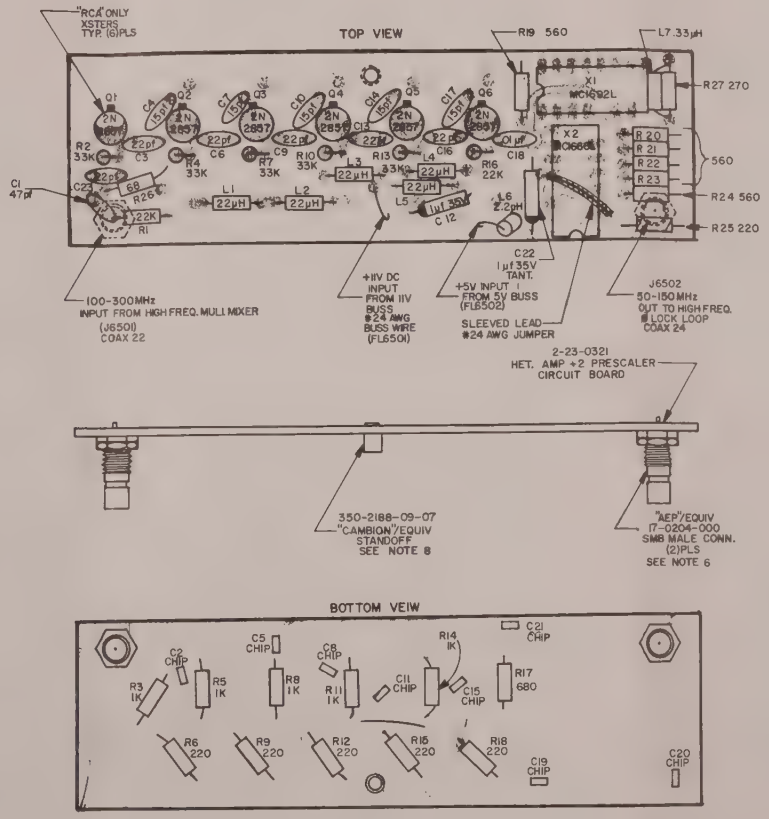

DATE | REV. | CHANGE | APP'D
A | INC. ECN # 1
B | INCORP ECN # 719 GLD
C | INCORP ECN # 1166
D | INCORP ECN # 1434
E | INC. ECN # 1941
F | INC ECN 2709
+11V DC INPUT FROM 11V BUSS
+5V DC INPUT FROM 5V BUSS
COAX 22 100-300 MHz INPUT FROM J6501 HIGH FREQ MULTIPLIER MIXER
COAX 24 50-150MHz OUT TO HIGH FREQ PLOCK LOOP
J6502
GND.
÷ 2
L6501 22 NH
L6502 22 NH
L6503 22 NH
C6512 1UF 35V TANT.
L6504 22 NH
L6505 22 NH
L6506 2.2 NH
C6519 .0018 CHIP
C6521 .0018 CHIP
C6522 1UF 35V TANT.
X6501A 1/2 MC1692L
X6501B 1/2 MC1692L
X6502A 1/2 MC1666L
X6502B 1/2 MC1666L
L6507 .33μH
C6520 .0018 CHIP
R6527 270Ω
R6524 560Ω
R6525 220Ω
R6526 560Ω
R6521 560Ω
R6522 560Ω
R6523 560Ω
R6519 560Ω
R6520 560Ω
1-23-0321
2. ONLY "RCA" TRANSISTERS MAY BE USED UNLESS OTHERWISE NOTED.
1. UNLESS OTHERWISE SPECIFIED ALL CAPS. ARE NPO TYPE.
NOTES:
EFFECTIVE: FM AM1000A THRU S/N 1169
23-0092 | 1 | FM/AM 1000A/B | 1 | 1 | 23-0065 | SCHEMATIC
NEXT ASS'Y | QTY | MODEL | ITEM | REQ'D | PART NO. | DESCRIPTION
APPLICATION | LIST OF MATERIALS
TOLERANCES
DRAWN 8-19-74
CHECKED
APPROVED
INSTRUMENT FLIGHT RESEARCH CORPORATION WICHITA, KANSAS.
TITLE HETERODYNE AMP AND ÷ 2 PRESCALER SCHEMATIC
MATERIAL
TREATMENT
FINISH
SIZE B | PART NUMBER 3-23-0065 | REV F
SCALE | WEIGHT | SHEET 1 OF 1

Figure 6-51

DATE	REV	CHANGE	APP'D
1-23-78	J	ORIGINAL RELEASE T.T.	DJ



10. ALL CHIP CAPACITORS ARE .0018 µf EXCEPT AS NOTED.
9. MAX. HEIGHT OF COMPONENTS TO BE .12 FROM BOTTOM SIDE OF BOARD.
8. INSTALL NO. 350-2188-09-07 "CAMBION"/EQUIV STANDOFF FROM BOTTOM SIDE OF BOARD.
7. SCHEMATIC NO. 3-23-0065.
6. INSTALL NO. 17-0204-000 "AEP"/EQUIV SMB MALE CONN. (2)PLS FROM BOTTOM SIDE OF BOARD.
5. CHIP CAPS. ARE ON BOTTOM OF BD. UNLESS NOTED.
4. MAX. HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
2. ALL CAPACITORS ARE NPO TYPE EXCEPT AS NOTED.
1. ALL RESISTORS ARE 1/4W, 10% TOL. EXCEPT AS NOTED.

NOTES:

EFFECTIVE: FM/AM1000A thru S/N 1169

ITEM	REQ'D	PART NO.	DESCRIPTION

LIST OF MATERIALS

NEXT ASSY	23-0228		
QTY	1		
MODEL	FM/AM 1000A/B		
APPLICATION			

TOLERANCES: UNLESS OTHERWISE SPECIFIED. ALL DIMENSIONS APPLY AFTER FINISH. DECIMALS .xx = ± .010 .xxx = ± .005. ANGLES ± 1/2°. FRACTIONS ± 1/64. SURFACE ROUGHNESS REMOVE ALL BURRS.

DRAWN: TEN EYCK 1-23-78. CHECKED. APPROVED. MATERIAL. FINISH.

-IFR INC- WICHITA, KANSAS

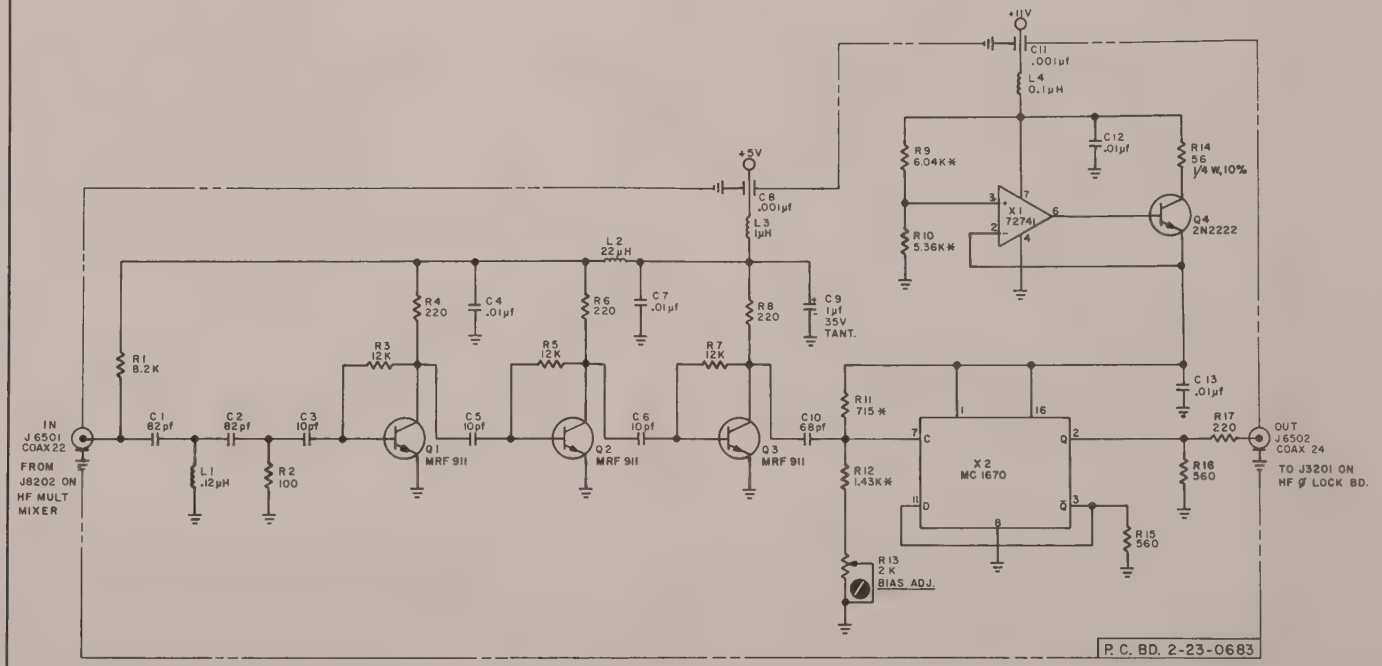
TITLE: HET. AMP ÷2 PRESCALER PC BOARD ASSEMBLY

SIZE C | PART NUMBER 3-23-0092 | REV J

SCALE 2:1 | WEIGHT | SHEET 1 OF 1

Figure 6-52

DATE	REV	CHANGE	APP'D
9/5/79	A	INC ECN 2949 JAJ	WW
9/13/79	A	INC ECN 2949 JGF	JWJ



EFFECTIVE: FM/AM1000A S/N 1170 & ON

NOTES:

1. ALL RES. ARE 1/8W, 10% TOL. EXCEPT AS NOTED.
2. THOSE CAPACITORS CALLED OUT IN PF ARE NPOS
3. "*" DENOTES 1/4W, 1% TOL. RES.

3-23-0685 HET. AMP. ÷2 PRESCALER

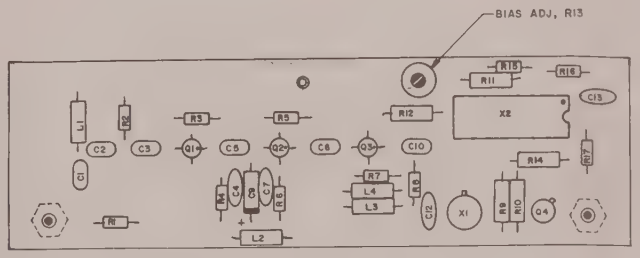
WICHITA, KANSAS

HET. AMP. ÷2 PRESCALER

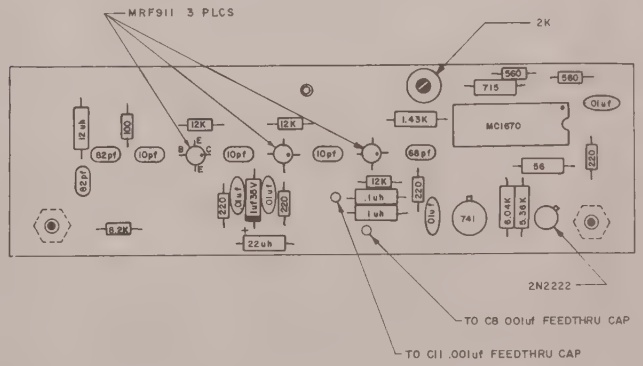
3-23-0685 A

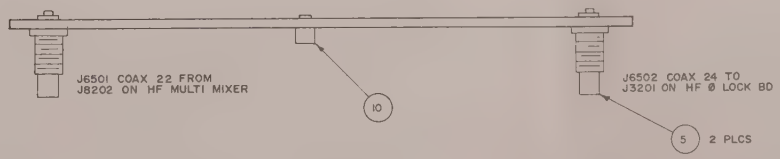
Figure 6-53

DATE	REV	CHANGE	APP'D



REF DWG.
PC BOARD 2-23-0683
SCHEMATIC 3-23-0685





EFFECTIVE: 1000A S/N 1170 & ON

6. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.
5. COMPONENT LEADS MAY EXTEND .04-.06 BEYOND BOTTOM OF BOARD AFTER SOLDERING
4. R9,10,11,12 ARE 1/4W, 1%
3. R14 IS 1/4W, 10%
2. R1 THRU R8, R15 THRU R17 ARE 1/8W, 10%
1. C1 – C3,5,6,10 ARE NPO CAPS

NOTES.

ITEM	REQ'D	PART NO.	DESCRIPTION
12			
11			
10	1	350-2188-09-07	STANDOFF "CAMBION" EQUIV
9			
8	A/R	AWG 26	SLEEVING
7	A/R	AWG 26	BUSS WIRE
6			
5	2	17-0204-000	CONNECTOR "AEP" EQU. V
4			
3	REF	3-23-0685	SCHEMATIC
2	1	2-23-0683	PC BOARD
1	1	1-23-0684	ASSY P/L

LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED

DRAWN DATE 4-14-78

CHECKED DATE

APPROVED DATE 4-22-78

-IFR INC-
WICHITA, KANSAS

HET AMP ÷ 2 PRESCALER
PC ASSY

NEXT ASSY	QTY	MODEL
23-0225	1	

APPLICATION

MATERIAL

FINISH

SIZE C | PART NUMBER 3-23-0684 | REV

SCALE 2x | WEIGHT | SHEET 1 OF 1

Figure 6-54

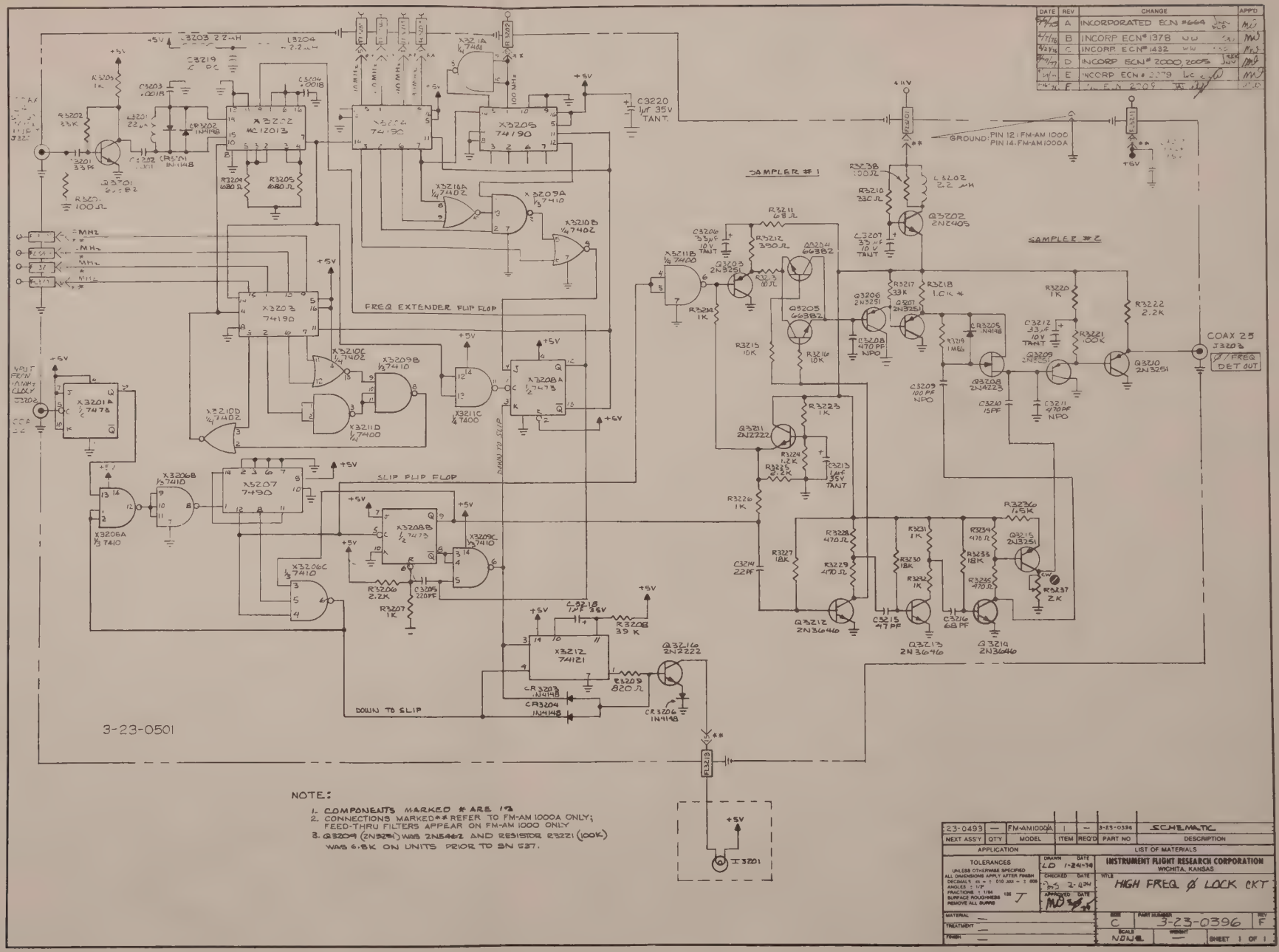
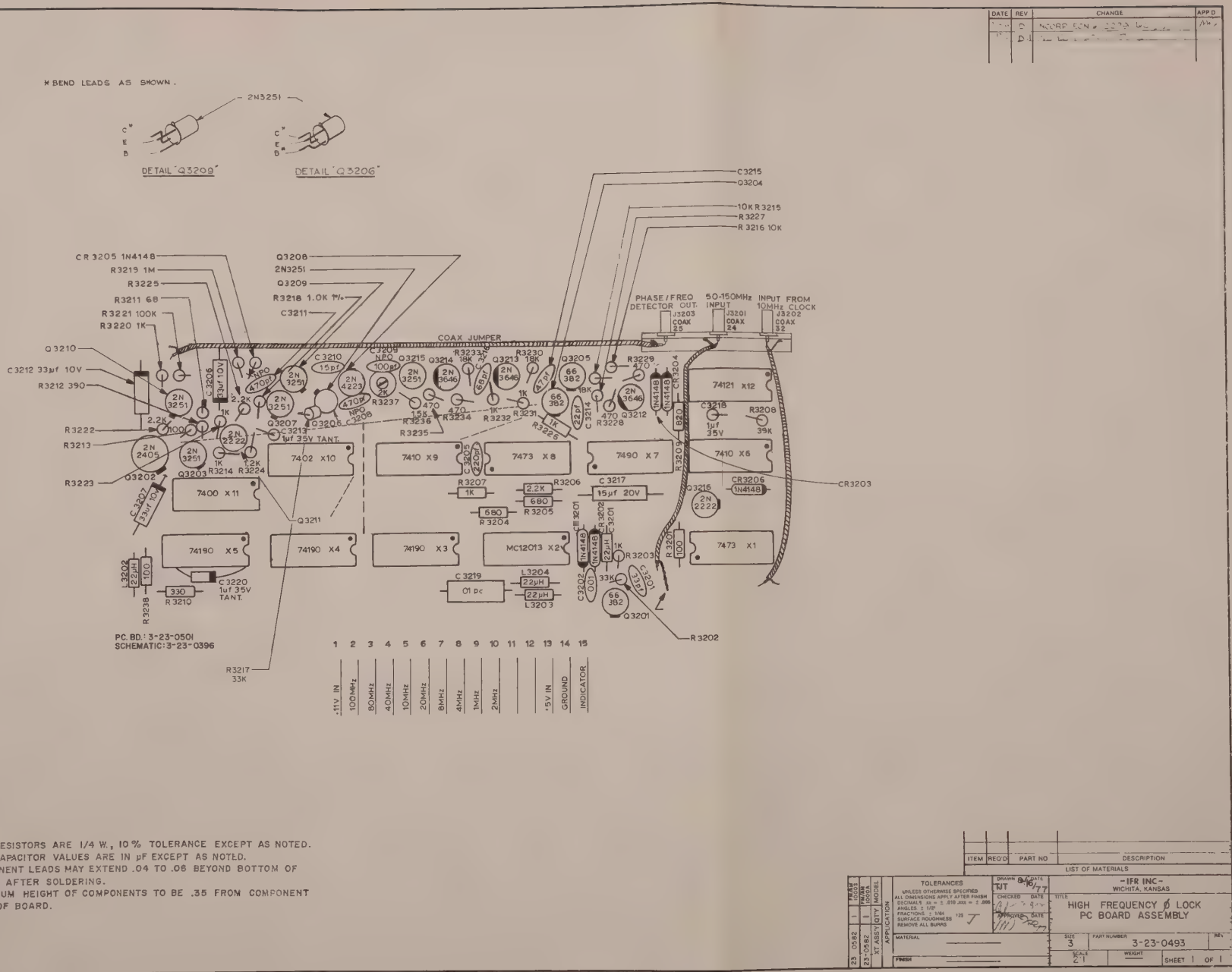

DATE | REV | CHANGE | APP'D
A INCORPORATED ECN #664
B INCORP ECN# 1378
C INCORP ECN# 1432
D INCORP ECN# 2000, 2005
E INCORP ECN # 2379
F ECN 2709
+5V
L3203 2.2 uH
L3204 2.2 uH
C3219 2 pf
R3201 33 PR
R3202 33K
R3203 1K
R3204 100 JL
C3203 .0018
C3204 .0018
CR3202 1N4148
CR3201 1N4148
L3201 2.2 uH
Q3201 2N3563
X3202 MC12013
R3208 680 JL
R3205 680 JL
X3204 74190
X3205 74190
X3206 74190
X3207 74190
X3201A 1/2 7473
X3202A 1/2 7473
X3208A 1/2 7473
X3208B 1/2 7473
X3211C 1/4 7400
X3211D 1/4 7400
X3210A 1/4 7402
X3210B 1/4 7402
X3210C 1/4 7402
X3210D 1/4 7402
X3209A 1/3 7410
X3209B 1/3 7410
X3209C 1/3 7410
X3206A 1/3 7410
X3206B 1/3 7410
X3206C 1/3 7410
X3218A 1/4 7402
X3218B 1/4 7400
X3212 74121
C3220 1 uf 35V TANT.
FREQ EXTENDER FLIP FLOP
SLIP FLIP FLOP
DOWN TO SLIP
R3206 2.2K
C3208 220PF
R3207 1K
C3218 1 uF 35V
R3208 39 K
R3209 820 JL
CR3203 1N4148
CR3204 1N4148
CR3206 1N4148
Q3216 2N2222
SAMPLER # 1
SAMPLER # 2
R3238 100 JL
R3210 330 JL
L3202 2.2 uH
Q3202 2N2405
R3211 68 JL
R3212 390 JL
C3206 33 pf 10V TANT
C3207 33 pf 10V TANT
Q3203 2N3251
Q3205 G6382
R3214 1K
R3215 10K
R3216 10K
R3217 33K
R3218 1.01K
Q3206 2N3251
Q3207 2N3251
C3208 470 PF NPO
R3219 1 MEG
CR3205 1N4148
R3220 1K
R3222 2.2K
C3212 33 pf 10V TANT
R3221 100K
Q3209 2N3251
Q3208 2N4223
C3209 100 PF NPO
C3210 15PF
C3211 470 PF NPO
Q3210 2N3251
COAX 25 J3203 Ø/FREQ DET OUT
R3223 1K
Q3211 2N2222
R3224 1.2K
R3225 2.2K
C3213 1 pf 35V TANT
R3226 1K
R3236 1.5K
R3228 470 JL
R3229 470 JL
R3227 12K
C3214 22PF
R3231 1K
R3230 18K
R3232 1K
R3234 470 JL
R3233 18K
R3235 470 JL
Q3215 2N3251
R3237 2K
Q3212 2N3646
Q3213 2N3646
Q3214 2N3646
C3215 47 PF
C3216 68 PF
R3213
J3201
GROUND: PIN 12: FM-AM 1000 PIN 14: FM-AM 1000A
100 MHz
10 MHz
1 MHz
100 KHz
10 KHz
1 KHz
100 Hz
10 Hz
1 Hz
3-23-0501
NOTE:
1. COMPONENTS MARKED # ARE 1%
2. CONNECTIONS MARKED ** REFER TO FM-AM 1000A ONLY; FEED-THRU FILTERS APPEAR ON FM-AM 1000 ONLY
3. Q3209 (2N3251) WAS 2N5462 AND RESISTOR 23221 (100K) WAS 6.8K ON UNITS PRIOR TO SN 537.
3-23-0493 — FM-AM1000A | 1 | — | 3-23-0396 SCHEMATIC
NEXT ASS'Y | QTY | MODEL | ITEM | REQ'D | PART NO | DESCRIPTION
APPLICATION | LIST OF MATERIALS
TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .XX = ± .010 .XXX = ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS REMOVE ALL BURRS
DRAWN LD 1-24-74
CHECKED DATE 2-4-74
APPROVED DATE
MATERIAL — TREATMENT — FINISH —
INSTRUMENT FLIGHT RESEARCH CORPORATION WICHITA, KANSAS
TITLE HIGH FREQ Ø LOCK CKT
SIZE C | PART NUMBER 3-23-0396 | REV F
SCALE NONE | WEIGHT — | SHEET 1 OF 1

Figure 6-55



NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN µF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.

ITEM REQ'D PART NO DESCRIPTION

LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .xx ± .010 .xxx ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS

DRAWN TJT DATE 9/16/77
CHECKED DATE
APPROVED DATE

-IFR INC- WICHITA, KANSAS

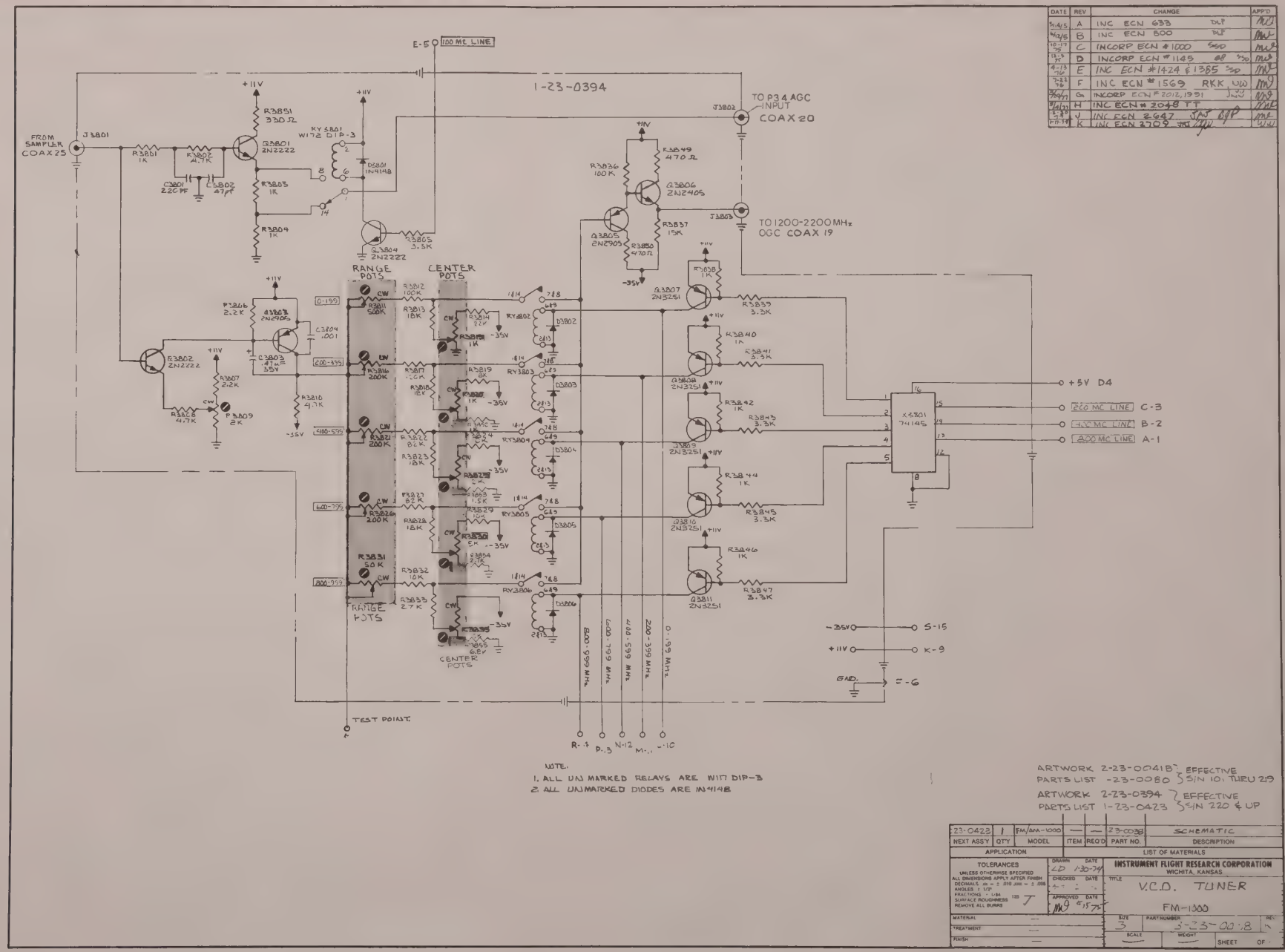
TITLE: HIGH FREQUENCY Ø LOCK PC BOARD ASSEMBLY

MATERIAL
FINISH

SIZE 3 PART NUMBER 3-23-0493 REV.
SCALE 2:1 WEIGHT SHEET 1 OF 1

TEST PROG NO. 23-0582
XT ASSY 23-0582
QTY 1
MODEL 1
APPLICATION

Figure 6-56



NOTE.
1. ALL UNMARKED RELAYS ARE W172 DIP-3
2. ALL UNMARKED DIODES ARE IN4148

DATE	REV	CHANGE	APP'D
5/4/5	A	INC ECN 633 DLP	
4/12/6	B	INC ECN 800 DLP	
10-17-75	C	INCORP ECN # 1000 SSD	
12-5-75	D	INCORP ECN # 1145 RR SSD	
4-13-76	E	INC ECN #1424 & 1385 SSD	
7-23-76	F	INC ECN #1569 RKK WD	
3/7/77	G	INCORP ECN # 2012, 1951 JJJ	
9/1/77	H	INC ECN # 2048 TT	
5-23-78	J	INC ECN 2647 JNJ GPP	
2-20-79	K	INC ECN 2709 JNJ GPP	

ARTWORK 2-23-0041B EFFECTIVE
PARTS LIST 2-23-0080 S/N 101 THRU 219
ARTWORK 2-23-0394 EFFECTIVE
PARTS LIST 1-23-0423 S/N 220 & UP

NEXT ASSY	QTY	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
23-0423	1	FM/AM-1000	—	—	23-0038	SCHEMATIC

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

MATERIAL —
TREATMENT —
FINISH —

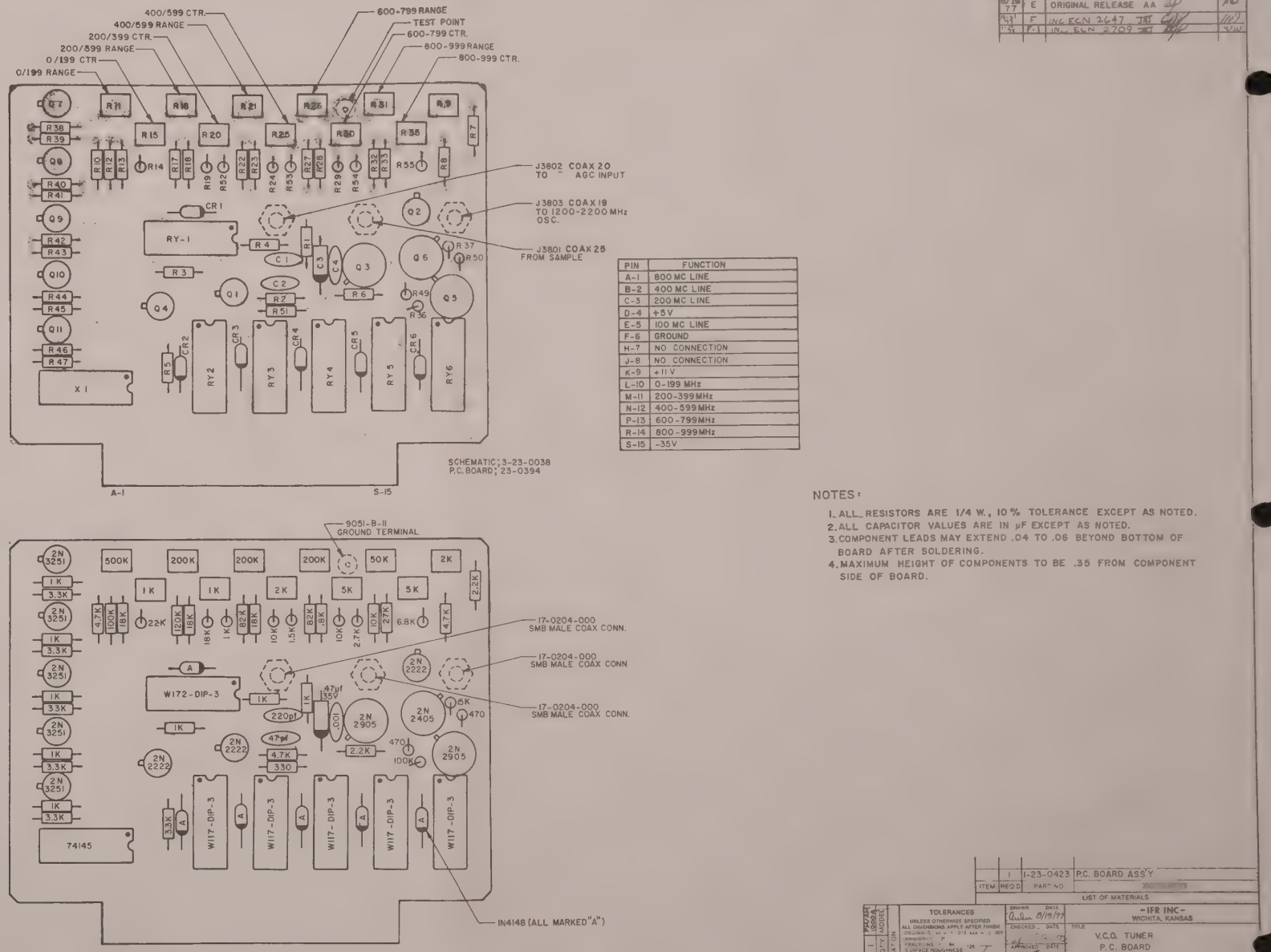
DRAWN LD 1-20-77
CHECKED
APPROVED MW 4/15/77

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE: V.C.O. TUNER FM-1000

SIZE 3 | PART NUMBER 3-23-0038 | REV K
SCALE | WEIGHT | SHEET OF

Figure 6-57



PIN	FUNCTION
A-1	800 MC LINE
B-2	400 MC LINE
C-3	200 MC LINE
D-4	+5 V
E-5	100 MC LINE
F-6	GROUND
H-7	NO CONNECTION
J-8	NO CONNECTION
K-9	+11 V
L-10	0-199 MHz
M-11	200-399 MHz
N-12	400-599 MHz
P-13	600-799 MHz
R-14	800-999 MHz
S-15	-35 V

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN μF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.

DATE	REV	CHANGE	APPD
8/19/77	E	ORIGINAL RELEASE AA	
9/1/77	F	INC ECN 2647 JAS	
1/5/78	G	INC ECN 2709 JAS	

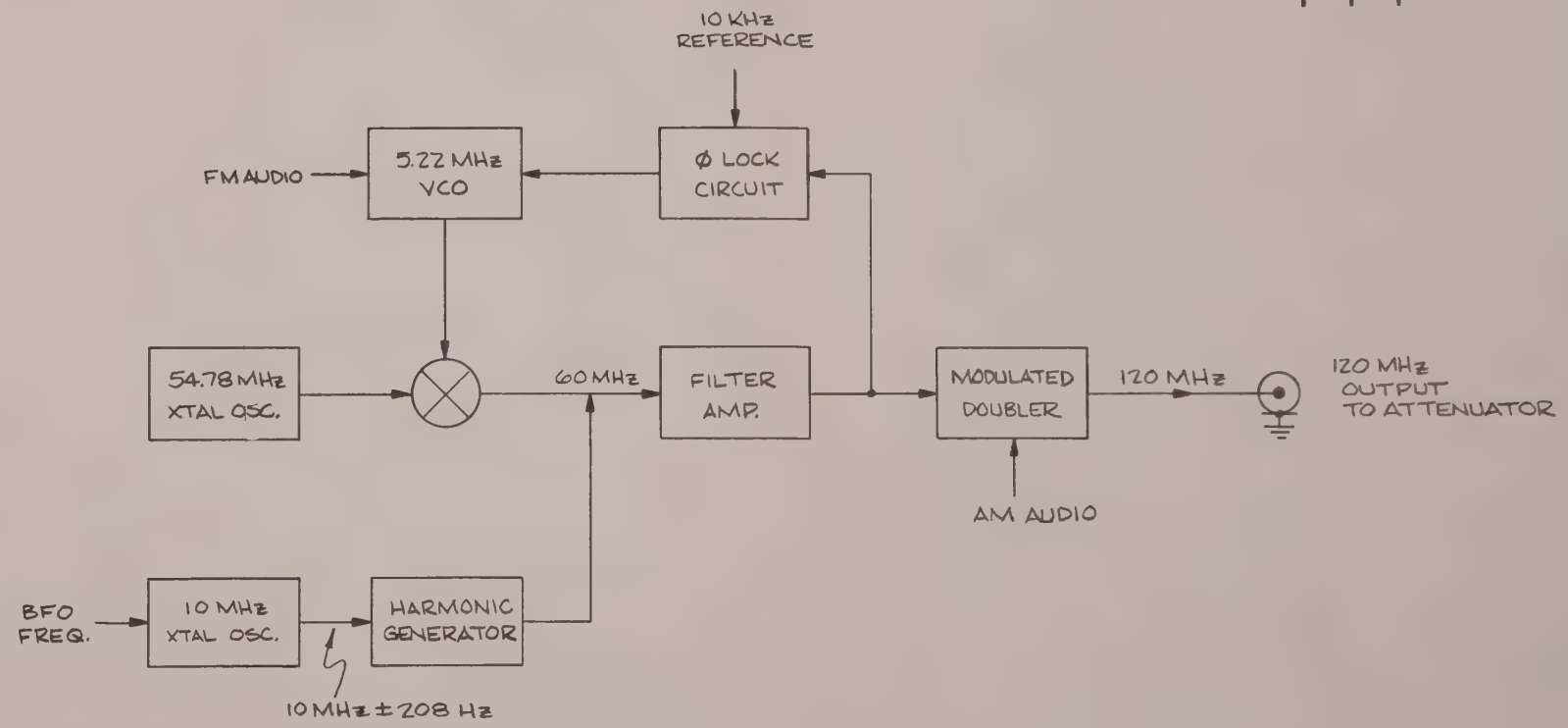
ITEM	REQ'D	PART NO	P.C. BOARD ASS'Y
	1	1-23-0423	

LIST OF MATERIALS

TOLERANCES	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DECIMALS .xx = ± .010 .xxx = ± .005 ANGULAR = ± 1° FRACTIONS = ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS
DRAWN	DATE 8/19/77
CHECKED	DATE
APPROVED	DATE
MATERIAL	
FINISH	
NEXT ASSY	1-23-0562
QTY/MODEL	1
APPLICATION	
TITLE	V.C.O. TUNER P.C. BOARD ASS'Y
SIZE	C
PART NUMBER	3-23-0423
REV	J
SCALE	2:1
WEIGHT	
SHEET	1 OF 1

-IFR INC-
WICHITA, KANSAS

Figure 6-58



DATE	REV	CHANGE	APP'D

NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION
		FM/AM-1000				

APPLICATION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN d.parks 5/14/75
CHECKED 5-14-75
APPROVED DATE

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE
120 MHz FM/AM GENERATOR
BLOCK DIAGRAM

MATERIAL
TREATMENT
FINISH

SIZE B | PART NUMBER 2-23-0416 | REV

SCALE — | WEIGHT — | SHEET 1 OF 1

Figure 6-59

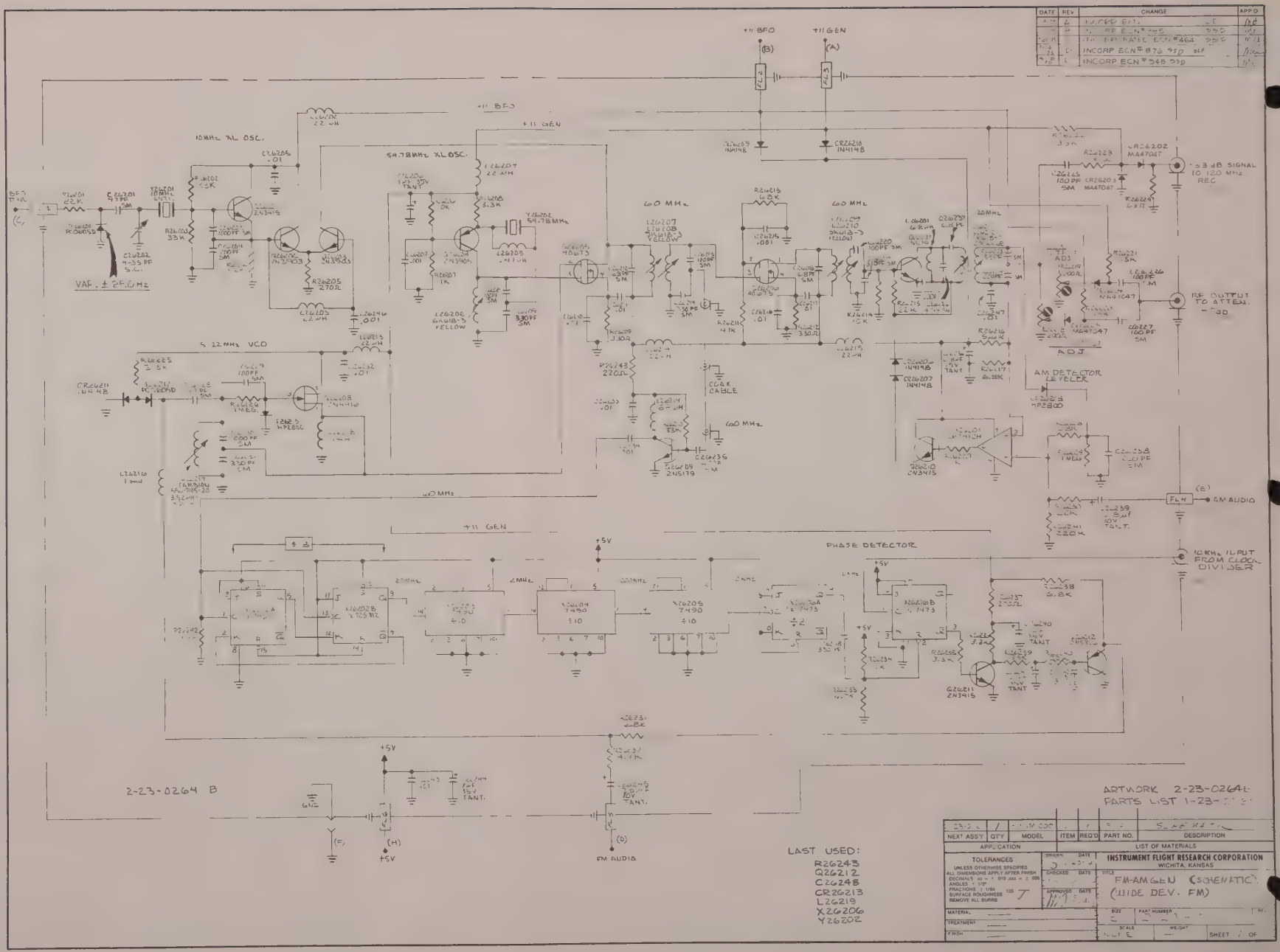
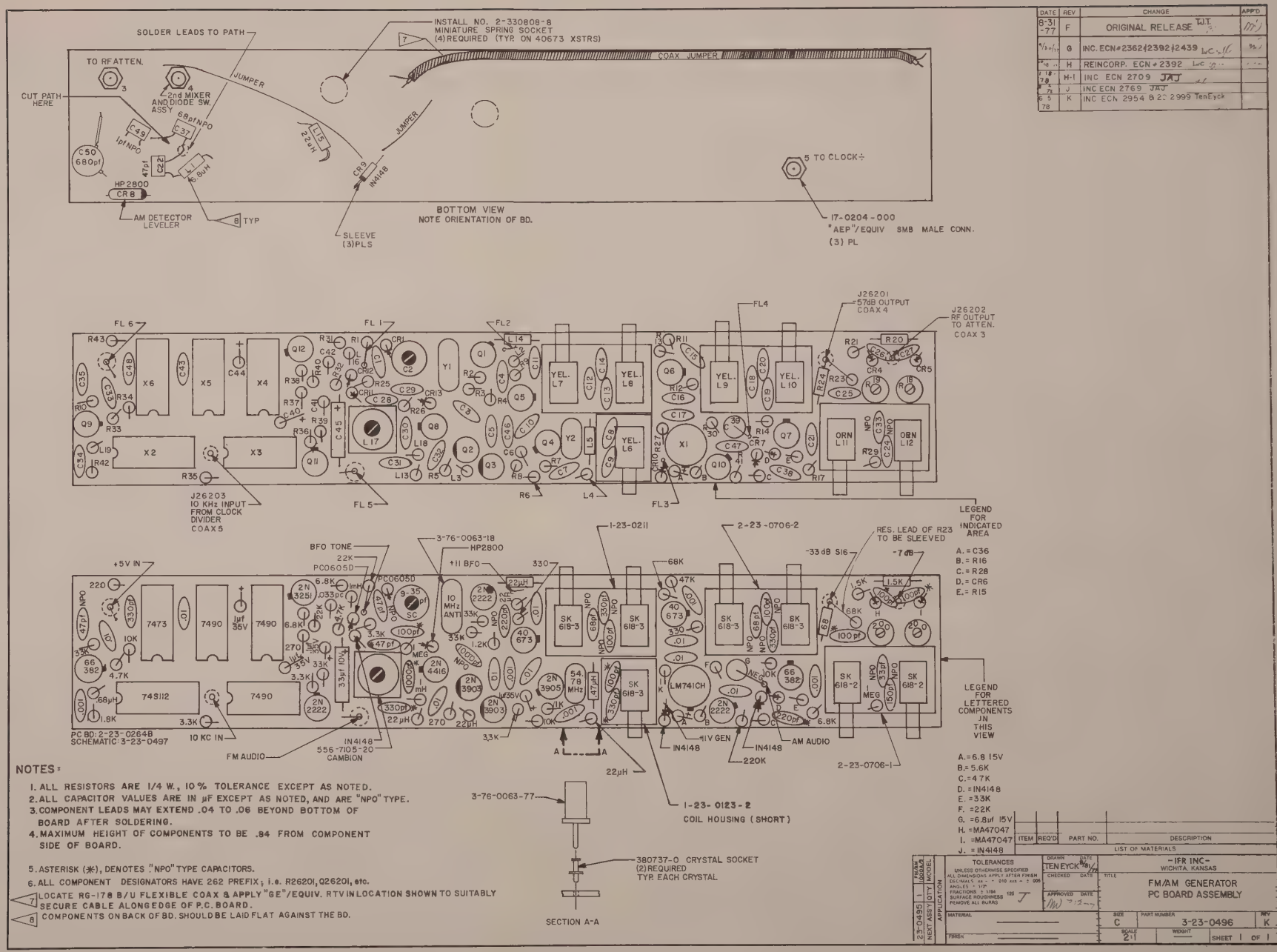

+11 BFO
+11 GEN
10MHz XL OSC.
54.78MHz XL OSC.
60 MHz
20MHz
5.22MHz VCO
VAR. ± 25.0 Hz
AM DETECTOR LEVELER
ADJ
RF OUTPUT TO ATTEN. -9D
-33 dB SIGNAL TO 120 MHz REC
AM AUDIO
10KHz INPUT FROM CLOCK DIVIDER
PHASE DETECTOR
+5V
2MHz
CCAX CABLE
2-23-0264 B
ARTWORK 2-23-0264
PARTS LIST 1-23-
LAST USED:
R26243
Q26212
C26248
CR26213
L26219
X26206
Y26202
LIST OF MATERIALS
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
FM-AM GEN (SCHEMATIC)
(WIDE DEV. FM)

Figure 6-60



DATE	REV	CHANGE	APP'D
8-31-77	F	ORIGINAL RELEASE W.T.	
5/2/78	G	INC. ECN #2362/2392/2439 LwC	
7/18/78	H	REINCORP. ECN #2392 LwC	
7/18/78	H-1	INC ECN 2709 JAJ	
8/5/78	J	INC ECN 2769 JAJ	
8/5/78	K	INC ECN 2954 8 25 2999 TenEyck	

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN µF EXCEPT AS NOTED, AND ARE "NPO" TYPE.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .84 FROM COMPONENT SIDE OF BOARD.
5. ASTERISK (*), DENOTES "NPO" TYPE CAPACITORS.
6. ALL COMPONENT DESIGNATORS HAVE 262 PREFIX; i.e. R26201, Q26201, etc.
7. LOCATE RG-178 B/U FLEXIBLE COAX & APPLY "GE"/EQUIV. RTV IN LOCATION SHOWN TO SUITABLY SECURE CABLE ALONG EDGE OF P.C. BOARD.
8. COMPONENTS ON BACK OF BD. SHOULD BE LAID FLAT AGAINST THE BD.

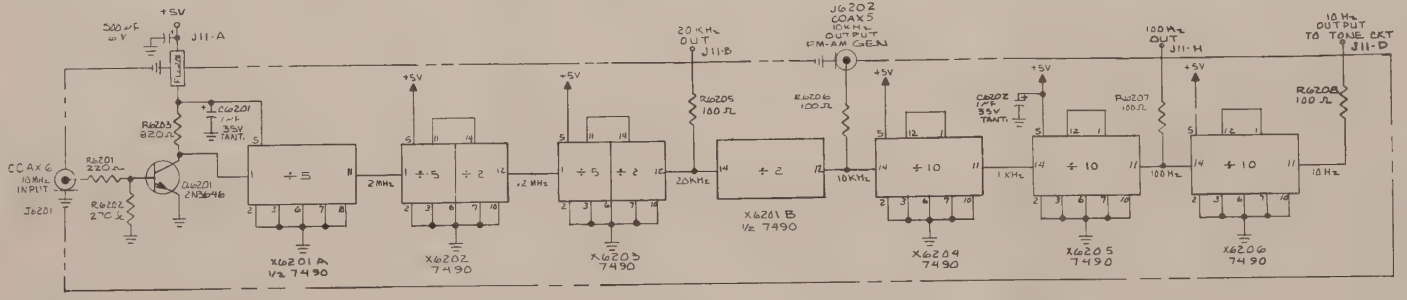
ITEM	REQ'D	PART NO.	DESCRIPTION

LIST OF MATERIALS

FINISH		- IFR INC - WICHITA, KANSAS	
MODEL		TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DECIMALS .xx = ± .010 .xxx = ± .005. ANGLES = 1/2°. FRACTIONS ± 1/64. SURFACE ROUGHNESS REMOVE ALL BURRS. 125	DRAWN TEN EYCK 8/31/77; CHECKED; APPROVED 7/12
QTY	1		TITLE: FM/AM GENERATOR PC BOARD ASSEMBLY
NEXT ASSY	23-0495	MATERIAL	SIZE C; PART NUMBER 3-23-0496; REV K
APPLICATION		FINISH	SCALE 2:1; WEIGHT; SHEET 1 OF 1

Figure 6-61

DATE	REV	CHANGE	APP'D
11-13-70	A	INC ECN #1 L.D.	
8-4-71	B	INC ECN #1205	
3-28-72	C	INCORP ECN #1467 WW	
2-15-73	D	INCORP ECN #1620 JWV	
7-27-73	E	INCORP ECN # 2541 AA	
7-18-75	G	DELETE QTY TO BE ADDED PER ECN #2709 INT	



23-0093	1	FM-AM-1000	—	—	23-0062	SCHEMATIC
NEXT ASS'Y	QTY	MODEL	ITEM	REQ'D	PART NO	DESCRIPTION

APPLICATION — LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 REMOVE ALL BURRS

DRAWN 6 2-28-74
CHECKED 2-27-74
APPROVED 3/31/75

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

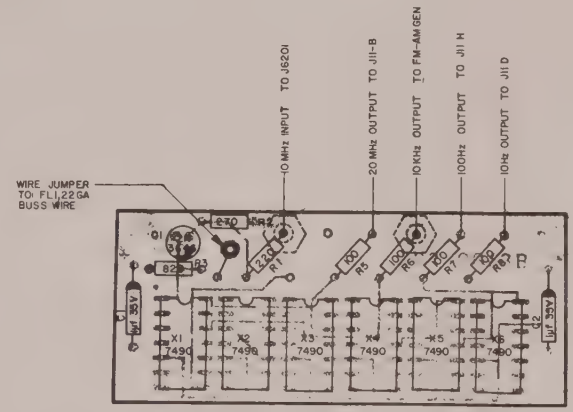
TITLE: CLOCK DIVIDER

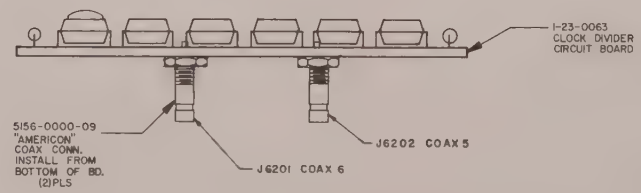
MATERIAL —
TREATMENT —
FINISH —

SIZE C | PART NUMBER 5-23-0062 | REV G
SCALE — | WEIGHT — | SHEET 1 OF 1

Figure 6-62

DATE	REV	CHANGE	APP'D
10-21-77	G	ORIGINAL RELEASE T.J.T	
1-18-78	G-1	INC ECN 2709 JAS	




1-23-0063 CLOCK DIVIDER CIRCUIT BOARD
5156-0000-09 "AMERICON" COAX CONN. INSTALL FROM BOTTOM OF BD. (2) PLS
J6201 COAX 6
J6202 COAX 5

4. SCHEMATIC NO 3-23-0062
3. MAXIMUM HEIGHT OF COMPONENTS TO BE .03 FROM COMPONENT SIDE OF BOARD.
2. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
1. ALL RES. ARE 1/4W, 10%TOL.

NOTES:

ITEM	REQ'D	PART NO	DESCRIPTION

LIST OF MATERIALS

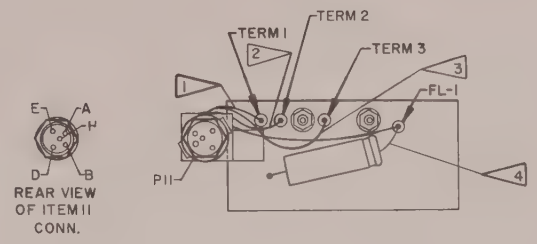
TOLERANCES	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DECIMALS .XX = ± .010 .XXX = ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS REMOVE ALL BURRS 125
DRAWN	Ten Eyck 10-21-77
CHECKED	10-21-77
APPROVED	DATE 11-11-77
MATERIAL	
FINISH	
TITLE	CLOCK DIVIDER PC BOARD ASSEMBLY
SIZE	C
PART NUMBER	3-23-0093
REV	G-1
SCALE	2:1
WEIGHT	
SHEET	1 OF 1

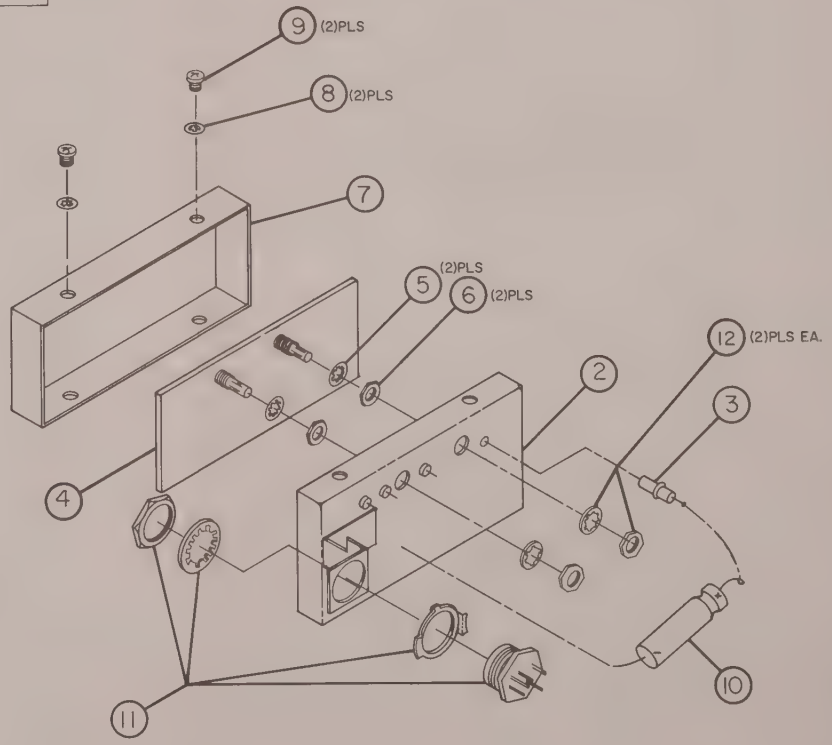
- IFR INC -
WICHITA, KANSAS

NEXT ASSY 23-087 | QTY 1 | MODEL FM/AM 1600 | APPLICATION

Figure 6-63

DATE	REV	CHANGE	APP'D
10-27-77	E	ORIGNAL RELEASE TT	MD
2/1/78	E-1	INC ECN 2688 JAT	WW
5/16/78	G	INCORP. ECN 3020 JT	WW





ITEM	REQ'D	PART NO	DESCRIPTION
12	2	———	ITEM 12 HDW. PART OF ITEM 4 CONNECTORS
11	1	M5PLRN	"WINCHESTER"/EQUIV (5) PIN MALE CONN.
10	1	401-500-6	"TEMPLE"/EQUIV ELECT CAP 500µf 6V
9	2	4-40 x 1/8	PBHMS
8	2	#4	INT TOOTH LOCKWASHER
7	1	2-23-0216-2	CLOCK DIVIDER ENCLOSURE COVER
6	2	10-32	SMALL PATTERN HEX. NUT
5	2	#10	INT TOOTH LOCKWASHER
4	1	3-23-0093	CLOCK DIVIDER PC BOARD ASSEMBLY
3	1	1203-050	ERIE/EQUIV FILTER
2	1	2-23-0216-1	CLOCK DIVIDER ENCLOSURE BASE
1	1	3-23-0217	CLOCK DIVIDER ASSEMBLY

LIST OF MATERIALS

ITEM	FROM	TO	COLOR	GA	LGTH	CODE	FUNCTION
1	TERM 1	P11-D	BRN	26	1.5		10Hz OUTPUT
2	TERM 2	P11-H	WHT/BLU	26	1.5		100Hz OUTPUT
3	FL-1	P11-A	ORN	26	3.0		+5V INPUT
4	TERM 3	P11-B	GRN	26	2.5		20KHz OUTPUT

ITEM 11 WIRING LIST

NOTES:
1. SOLDER POSITIVE LEAD OF ITEM 10 CAP. TO ITEM 3 FILTER AND SOLDER NEG. LEAD OF SAME CAP. TO ITEM 2 ENCLOSURE AS INDICATED.

NEXT ASSY	QTY	MODEL
23-0216	1	1650A
23-0644	1	1651A

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: XX = ± .010 XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN TenEyck DATE 10-27-77
CHECKED DATE
APPROVED DATE

MATERIAL
FINISH

- IFR INC -
WICHITA, KANSAS

TITLE
CLOCK DIVIDER ASSEMBLY

SIZE C | PART NUMBER 3-23-0217 | REV G
SCALE 1:1 | WEIGHT ——— | SHEET 1 OF 1

Figure 6-64

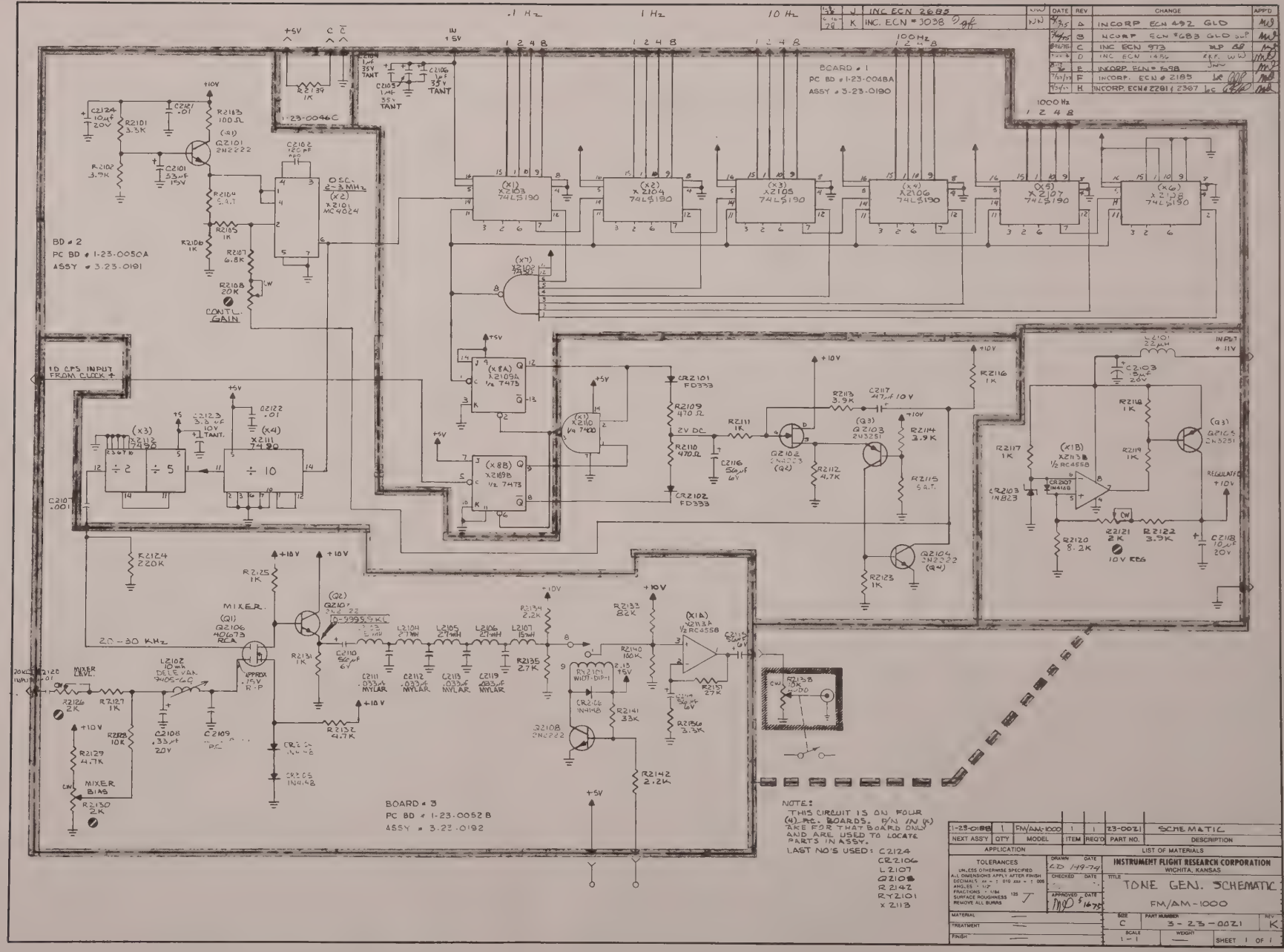
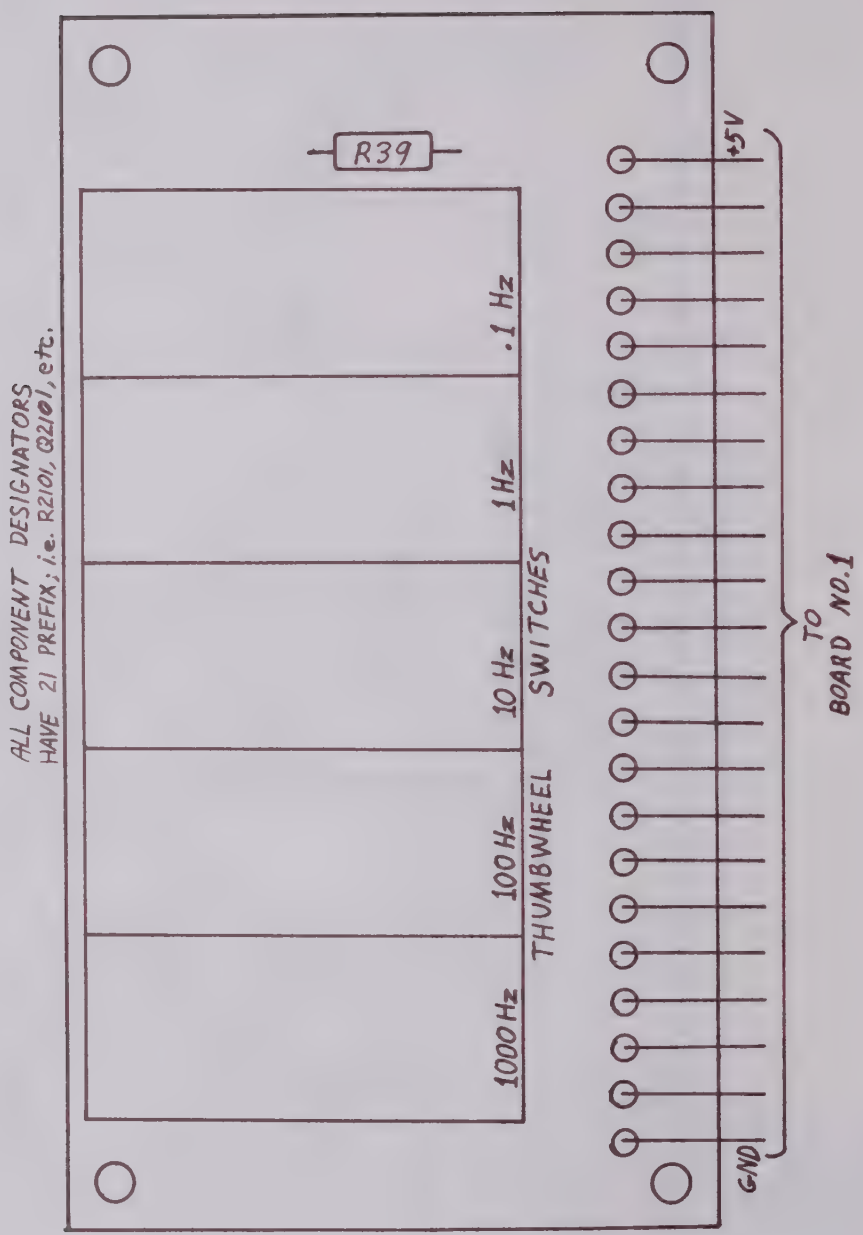

BOARD # 1
PC BD # 1-23-0048A
ASSY # 3-23-0190
BD # 2
PC BD # 1-23-0050A
ASSY # 3-23-0191
BOARD # 3
PC BD # 1-23-0052 B
ASSY # 3.23.0192
1-23-0046C
10 CPS INPUT FROM CLOCK
CONT. GAIN
MIXER
MIXER BIAS
MIXER LEVEL
2.0 - 30 KHz
OSC. 2-3 MHz
REGULATED +10V
10V REG
INPUT +11V
NOTE:
THIS CIRCUIT IS ON FOUR (4) PC. BOARDS. P/N IN (#) ARE FOR THAT BOARD ONLY AND ARE USED TO LOCATE PARTS IN ASSY.
LAST NO'S USED: C2124 CR2106 L2107 Q2108 R2142 RY2101 X2113
INCORP ECN 2682
INC. ECN # 3038
INCORP ECN 492 GLD
INCORP ECN #683 GLD SLP
INC ECN 973
INC ECN 1456
INCORP ECN # 598
INCORP. ECN # 2185
INCORP. ECN # 2201 & 2307
1-23-0018B
FM/AM-1000
23-0021
SCHEMATIC
TONE GEN. SCHEMATIC
FM/AM-1000
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
3-23-0021

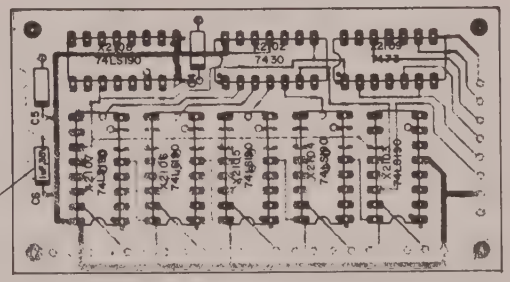
Figure 6-65



Modulation Frequency Switch
Mother Board Parts Layout
1-23-0046C

Figure 6-66

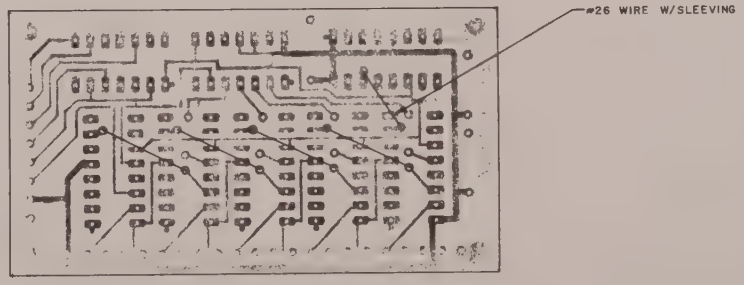
DATE	REV	CHANGE	APP'D
9/16/77	D	NEW RELEASE	



COMPONENT VIEW

REF DWG:

PC BOARD	1-23-0048
SCHEMATIC	3-23-0021



BOTTOM VIEW

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN μF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .19 FROM COMPONENT SIDE OF BOARD.

ITEM	REQ'D	PART NO	DESCRIPTION
3	1	1-23-0048	PC BOARD
2	REF	3-23-0021	SCHEMATIC
1	1	1-23-0190	ASSY

LIST OF MATERIALS

TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DECIMALS xx = ± .010 xxx = ± .005 ANGLES = 1/2° FRACTIONS = 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS

DRAWN: JT 8-18-77 | CHECKED | APPROVED

- IFR INC -
WICHITA KANSAS

TITLE: TONE GENERATOR ASSY BOARD NO. 1

MATERIAL: —— | FINISH: ——

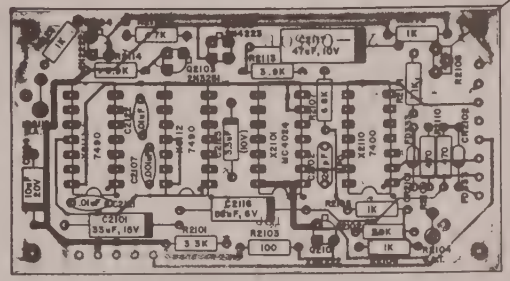
SIZE: C | PART NUMBER: 3-23-0190 | REV: D

SCALE: 1 X 1 | WEIGHT: —— | SHEET 1 OF 1

NEXT ASSY: 23-0168 | QTY: 1 | MODEL: 1600A | APPLICATION:

Figure 6-67

DATE	REV	CHANGE	APP'D
1/16/77	D	NEW RELEASE	
4/14/77	E	INCORP. ECN # 2281 & 2367 Inc	
6/6/77	F	INC. ECN # 3038	



COMPONENT SIDE

REF DWG:

PC BOARD	1-23-0050
SCHEMATIC	3-23-0021

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN μF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.
5. UNLESS OTHERWISE SPECIFIED:
   ALL TRANSISTORS ARE 2N2222
   ALL DIODES ARE FD333

ITEM	REQ'D	PART NO	DESCRIPTION
3	1	1-23-0050	PC BOARD
2	REF	3-23-0021	SCHEMATIC
1	1	1-23-0191	ASSY

LIST OF MATERIALS

NEXT ASSY	23-0186
QTY	1
MODEL	1760
APPLICATION	

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DEC. MAX. XX = ± .010 XXX = ± .005
ANGLES = 1°
FRACTIONS = 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN 8/24/77
CHECKED
APPROVED

- IFR INC -
WICHITA, KANSAS

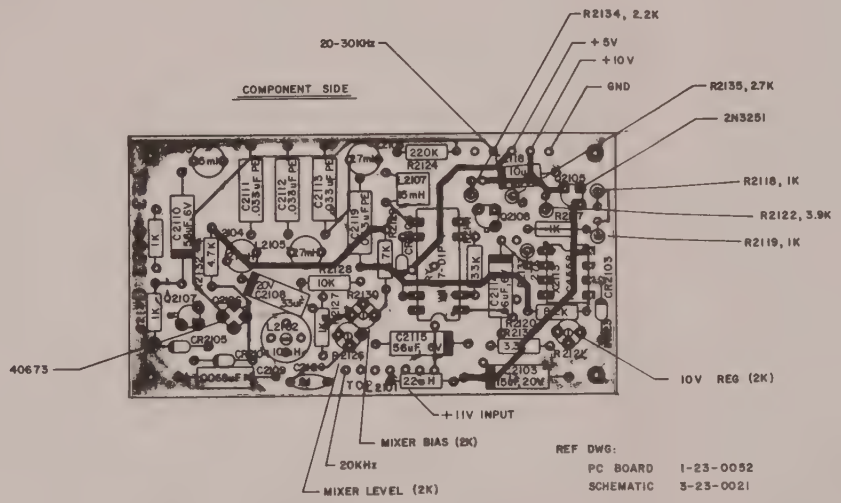
TITLE: TONE GENERATOR ASSY BOARD NO. 2

MATERIAL
FINISH

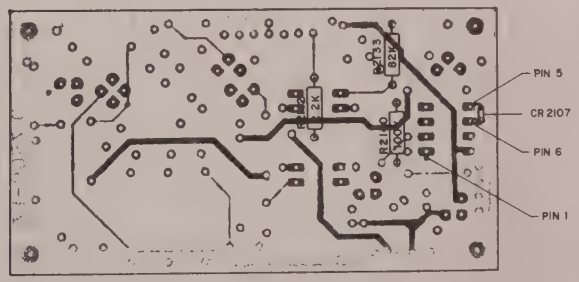
SIZE C | PART NUMBER 3-23-0191 | REV F
SCALE 2X1 | WEIGHT | SHEET 1 OF 1

Figure 6-68

DATE	REV.	CHANGE	APP'D
11/6/77	G	NEW RELEASE	
1-4-78	H	INCORP. ECN # 2281 & 2367	
4-8	J	INC ECN 2683	



REF DWG:
PC BOARD 1-23-0052
SCHEMATIC 3-23-0021



BOTTOM SIDE

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN μF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .50 FROM COMPONENT SIDE OF BOARD.
5. UNLESS OTHERWISE SPECIFIED;
   ALL TRANSISTORS ARE 2N2222
   ALL DIODES ARE IN4148

ITEM	REQ'D	PART NO	DESCRIPTION
3	1	1-23-0052	PC BOARD
2	REF	3-23-0021	SCHEMATIC
1	1	1-23-0190	ASSY

LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS APPLY AFTER FINISH; DECIMALS .xx = ± .010 .xxx = ± .005; ANGLES ± 1/2°; FRACTIONS ± 1/64; 125 J; SURFACE ROUGHNESS; REMOVE ALL BURRS

DRAWN JJ 8/25/77 | CHECKED | APPROVED

MATERIAL | Finish

- IFR INC -
WICHITA, KANSAS

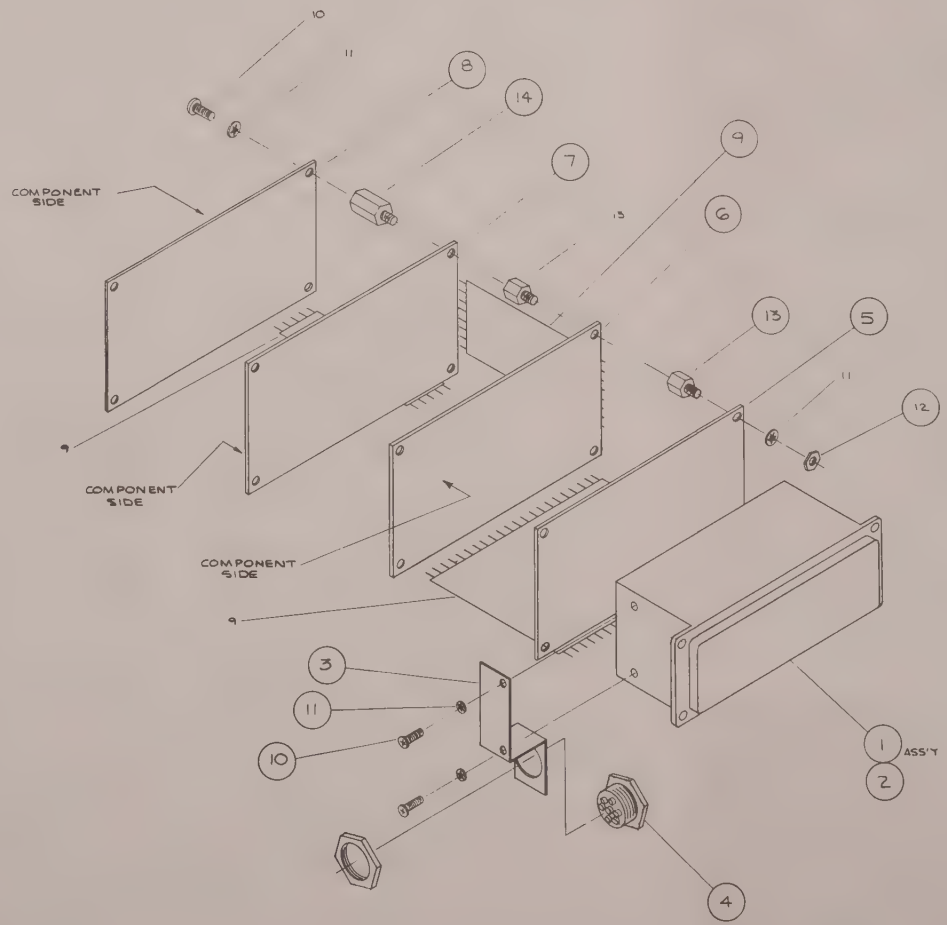
TITLE: TONE GENERATOR ASSY BOARD NO. 3

SIZE C | PART NUMBER 3-23-0192 | REV J

SCALE 2 X 1 | WEIGHT | SHEET 1 OF 1

NEXT ASSY 23-0188 | QTY 1 | MODEL PA/FA 10-00C | APPLICATION

Figure 6-69



DATE	REV	CHANGE	APP'D
12-15-77	E	INITIAL RELEASE TT	

ITEM	REQ'D	PART NO.	DESCRIPTION
14	4	MS16-33 -3HC	SHELL NUT, POSITRONICS*
13	8	76003-2	SHELL NUT
12	4	#4-40	LARGE PATTERN HEX NUT
11	10	#4	INT. TOOTH LOCKWASHER
10	6	M-40B3/16	PAN HEAD SCREW, BIND HEAD
9	A/R	1SN-3W-24	"ANSLEY"/EQUIV FLEXSTEEL
8	1	23-0192	TONE GEN. BOARD #3 ASS'Y
7	1	23-0191	TONE GEN. BOARD #2 ASS'Y
6	1	23-0190	TONE GEN. BOARD #1 ASS'Y
5	1	23-0046	TONE GEN. MOTHER BOARD
4	1	147FJEN	"WINCHESTER"/EQUIV. PLUG
3	1	23-0292	PLUG MOUNTING BRACKET
2	1	23-0048	BECO"/EQUIV SWITCH ASS'Y
1	1	23-0188	TONE GENERATOR ASS'Y

LIST OF MATERIALS

NEXT ASS'Y	QTY	MODEL
23-0188	1	FN/AM-1000

APPLICATION

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .XX = ± .010 .XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64 125
SURFACE ROUGHNESS
REMOVE ALL BURRS

DRAWN JWW 12/15/77
CHECKED [illegible] 12-19-77
APPROVED MD 12-15-77

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

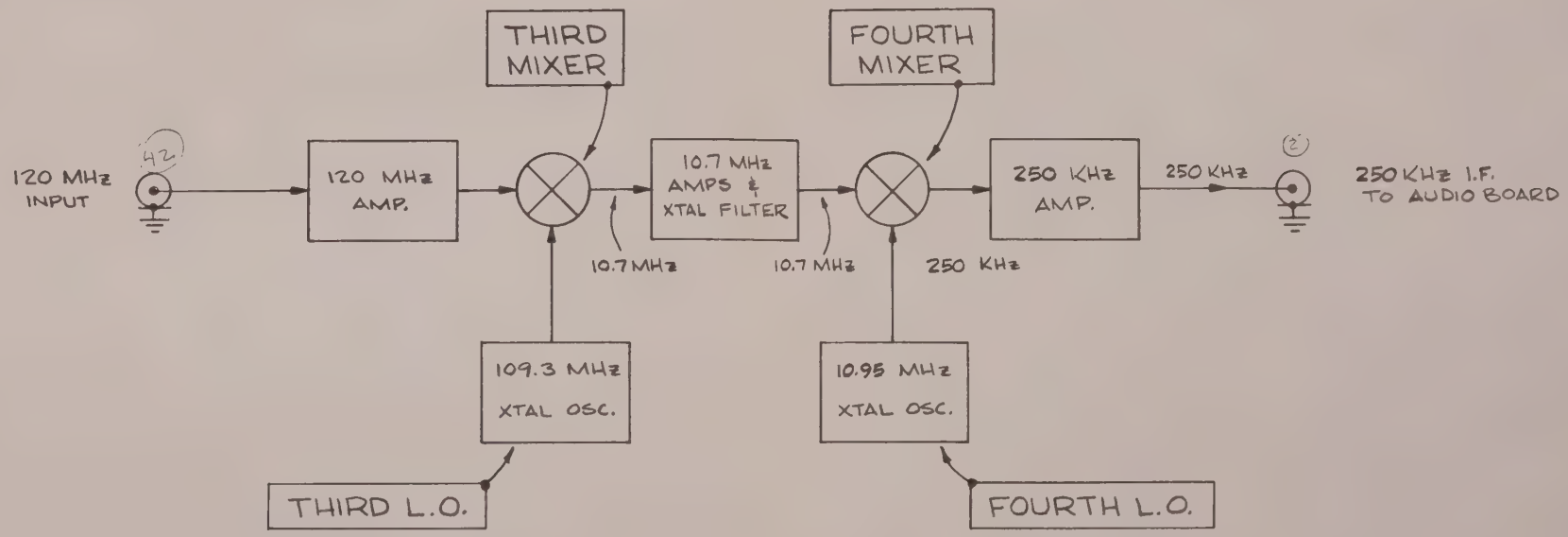
TITLE: TONE GENERATOR ASSEMBLY FN/AM-1000

MATERIAL: SEE ABOVE
TREATMENT
FINISH

SIZE C | PART NUMBER 23-0188 | REV E
SCALE 1/1 | WEIGHT | SHEET 1 OF 1

Figure 6-70

DATE	REV	CHANGE	APP'D



		FM/AM1000A	1	1	23-0521	BLOCK DIAGRAM
NEXT ASS'Y	QT'Y	MODEL	ITEM	REQ'D	PART NO.	DESCRIPTION

APPLICATION | LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 ✓
REMOVE ALL BURRS

DRAWN SIMMONS 12/10/75
CHECKED SSD 12-12-75
APPROVED MO 12 10 75

MATERIAL —
TREATMENT —
FINISH —

INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS

TITLE: 120 MHz RECEIVER BLOCK DIAGRAM

SIZE B | PART NUMBER 2-23-0521 | REV
SCALE — | WEIGHT — | SHEET 1 OF 1

Figure 6-71

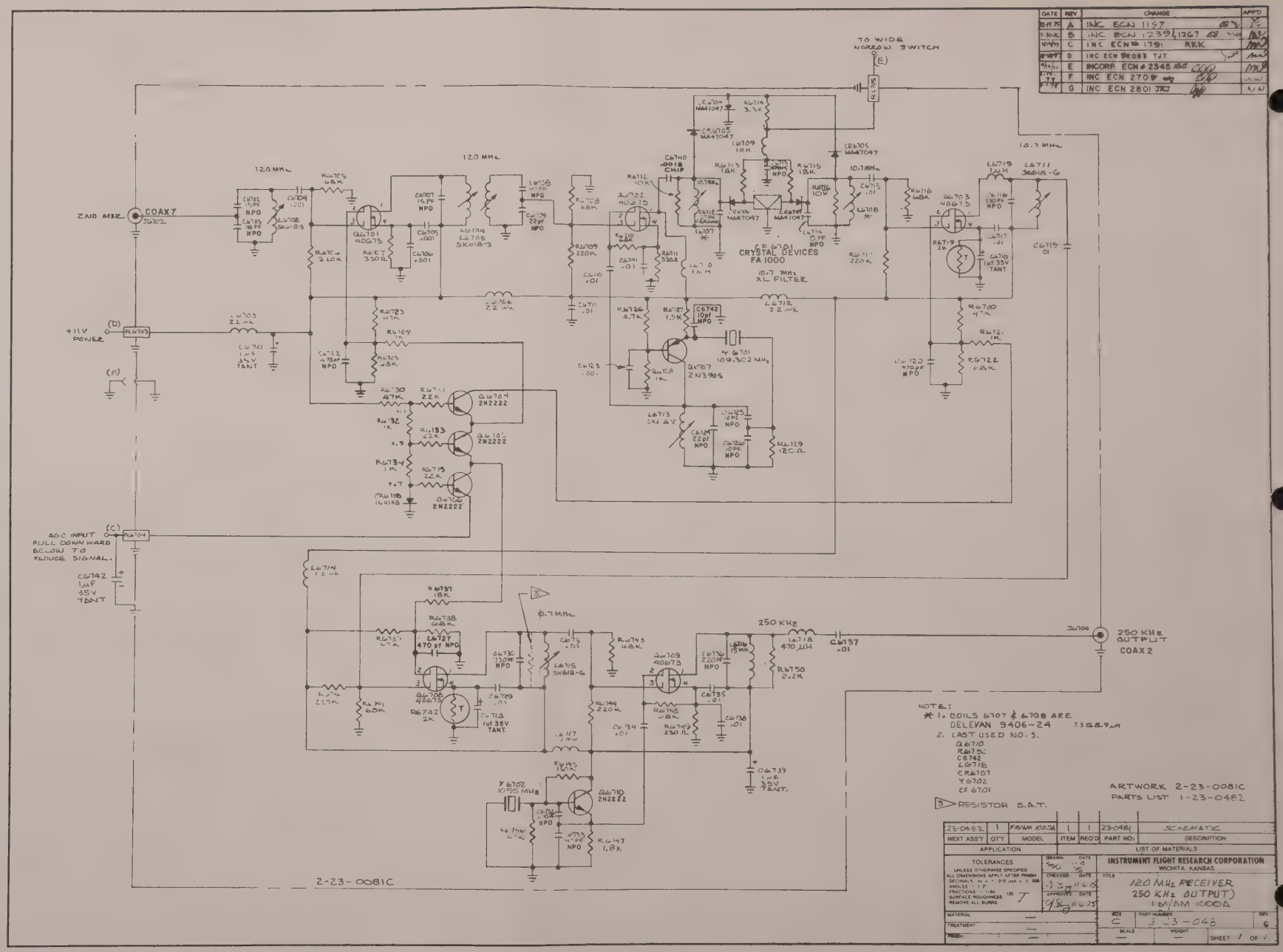
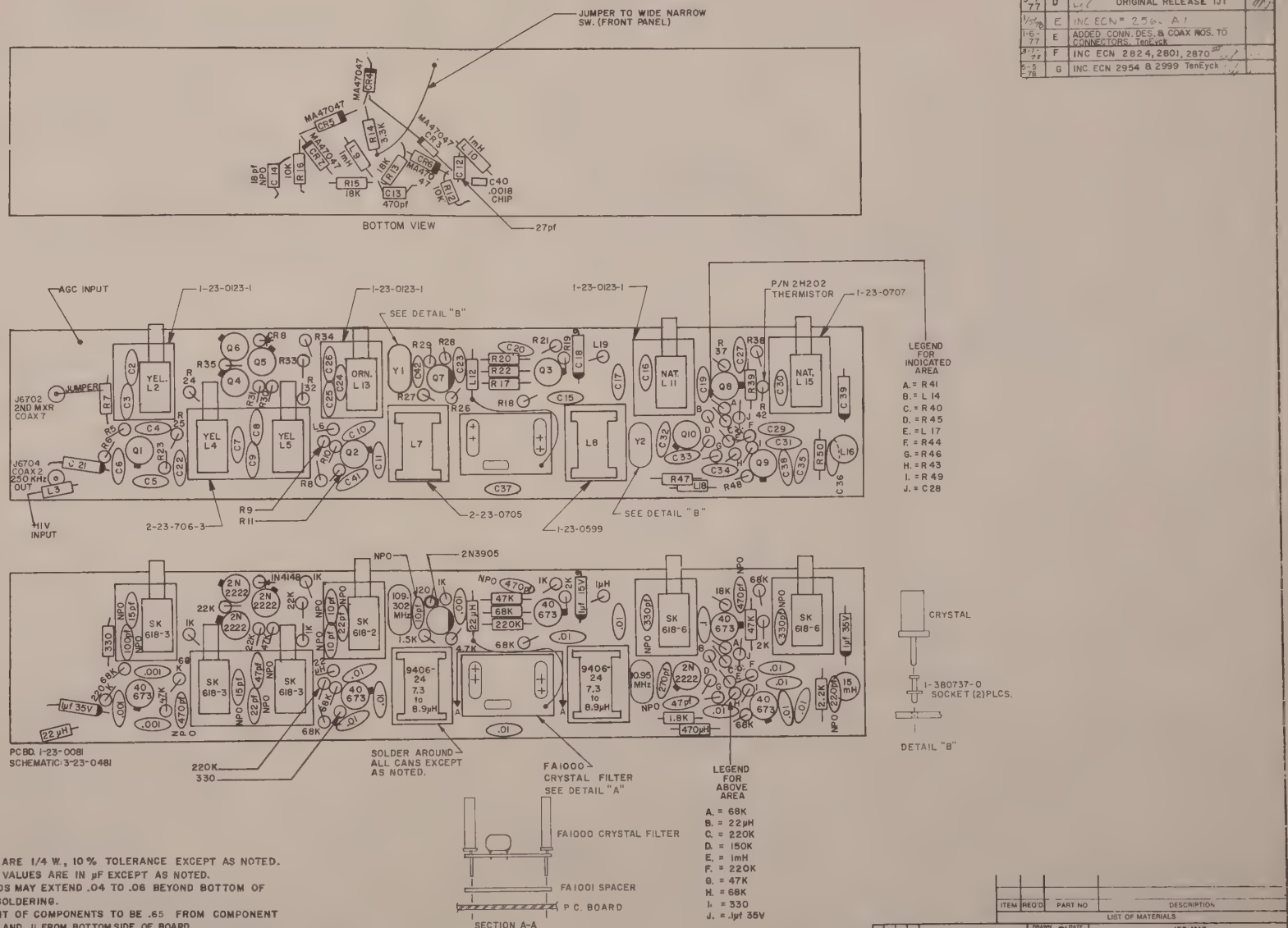

TO WIDE NARROW SWITCH
120 MHz
10.7 MHz
2ND MIX
COAX 7
+11 V POWER
AGC INPUT PULL DOWNWARD BELOW TO REDUCE SIGNAL.
CRYSTAL DEVICES FA 1000
10.7 MHz XL FILTER
0.7 MHz
250 KHz
250 KHz OUTPUT COAX 2
2N2222
2N3906
2N4416
MA47047
40673
NOTE:
1. COILS 6707 & 6708 ARE DELEVAN 9406-24 7.3 ≅ 8.9 μH
2. LAST USED NO. S.
Q6710
R6750
C6742
L6718
CR6707
Y6702
CF 6701
RESISTOR S.A.T.
ARTWORK 2-23-0081C
PARTS LIST 1-23-0482
2-23-0081C
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA KANSAS
120 MHz RECEIVER 250 KHz OUTPUT) FM/AM 10000A
2-23-0482 SCHEMATIC
FM/AM 10000A
23-0481

Figure 6-72



DATE	REV	CHANGE	APP'D
9-1-77	D	ORIGINAL RELEASE TJT	
1-6-78	E	INC ECN 2536. A!	
1-6-77	E	ADDED CONN. DES. & COAX NOS. TO CONNECTORS. TenEyck	
3-1-78	F	INC ECN 2824, 2801, 2870	
6-5-78	G	INC. ECN 2954 & 2999 TenEyck	

NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN µF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .65 FROM COMPONENT SIDE OF BOARD AND .11 FROM BOTTOM SIDE OF BOARD.
5. PLACE CHIP CAPACITORS ON BACK SIDE OF BOARD.
6. ALL COMPONENT DESIGNATORS HAVE 67 PREFIX; i.e. R6701, Q6701 etc.

ITEM	REQ'D	PART NO	DESCRIPTION

LIST OF MATERIALS

MFR'S CODE	10924
MFR'S PART NO.	23-0481
NEXT ASSY	1
APPLICATION	1

TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DECIMALS .XX ± .010 .XXX ± .005. ANGLES ± 1/2°. FRACTIONS ± 1/64. SURFACE ROUGHNESS 125. REMOVE ALL BURRS.

MATERIAL

FINISH

DRAWN TJT DATE 9/26/77

CHECKED DATE

APPROVED DATE

- IFR INC -
WICHITA, KANSAS

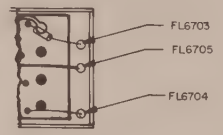
TITLE: 120MHz RECEIVER PC BOARD ASSEMBLY

SIZE C | PART NUMBER 3-23-0482 | REV 6

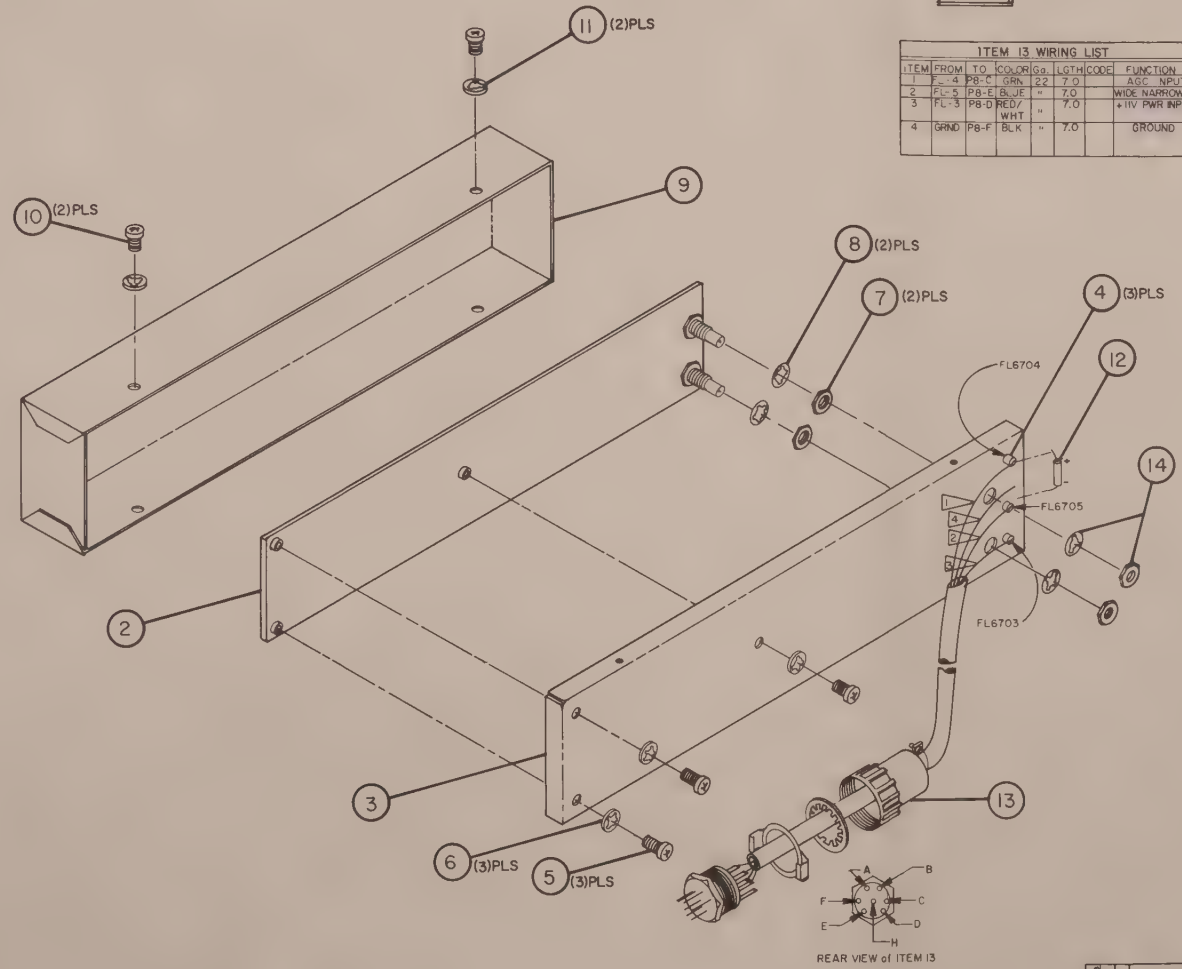
SCALE 2:1 | WEIGHT | SHEET 1 OF 1

Figure 6-73

DATE	REV	CHANGE	APP'D
8-17-77	D	ORIGINAL RELEASE TT	MM
1/5/78	E	INC ECN #2677 AA	CAD



ITEM 13 WIRING LIST							
ITEM	FROM	TO	COLOR	Ga.	LGTH	CODE	FUNCTION
1	FL-4	P8-C	GRN	22	7.0		AGC INPUT
2	FL-5	P8-E	BLUE	"	7.0		WIDE NARROW SW
3	FL-3	P8-D	RED/WHT	"	7.0		+11V PWR INPUT
4	GRND	P8-F	BLK	"	7.0		GROUND



REAR VIEW of ITEM 13

ITEM	REQ'D	PART NO	DESCRIPTION
			LIST OF MATERIALS
14	2	———	ITEM 14 HDW PART OF ITEM 2 CONNECTORS
13	1	M7PLSH19C	"WINCHESTER"/EQUIV (7)POS MALE CONNECTOR
12	1	T350A105M035AS	"KEMET"/EQUIV TANT CAP 1µf 35V
11	2	#4	INT TOOTH LOCKWASHER
10	2	#4-40 x 3/16	PBHMS
9	1	3-23 0484-2	120 MHz RCVR PC BD. ENCLOSURE COVER
8	2	#10	INT TOOTH LOCKWASHER
7	2	#10 32	EXTRA SMALL PATTERN HEX NUT
6	3	#2	INT TOOTH LOCKWASHER
5	3	#2-56 x 1/4	PBHMS
4	3	51-708-001	"SPECTRUM"/EQUIV FILTER
3	1	3-23-0484-1	120MHz RCVR. ENCLOSURE BASE
2	1	1-23-0482	120MHz RECEIVER PC BOARD ASSEMBLY
1	1	3-23-0483	120MHz RECEIVER ASSEMBLY

1 "▷" DENOTES ITEM NOS. REFERENCED IN ITEM 13 WIRING LIST

NOTES:

MAN'S MODEL	TOLERANCES	DRAWN TenEyck 10-1-77	-IFR INC- WICHITA, KANSAS
QTY	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .xx = ± .010 .xxx = ± .005 ANGLES ± 1/2° FRACTIONS ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS	CHECKED DATE	TITLE 120 MHz RECEIVER ASSEMBLY
1		APPROVED DATE	
NEXT ASSY		MATERIAL	SIZE C PART NUMBER 3-23-0483 REV
23-0492		FINISH	SCALE FULL WEIGHT —— SHEET 1 OF 1
APPLICATION			

Figure 6-74

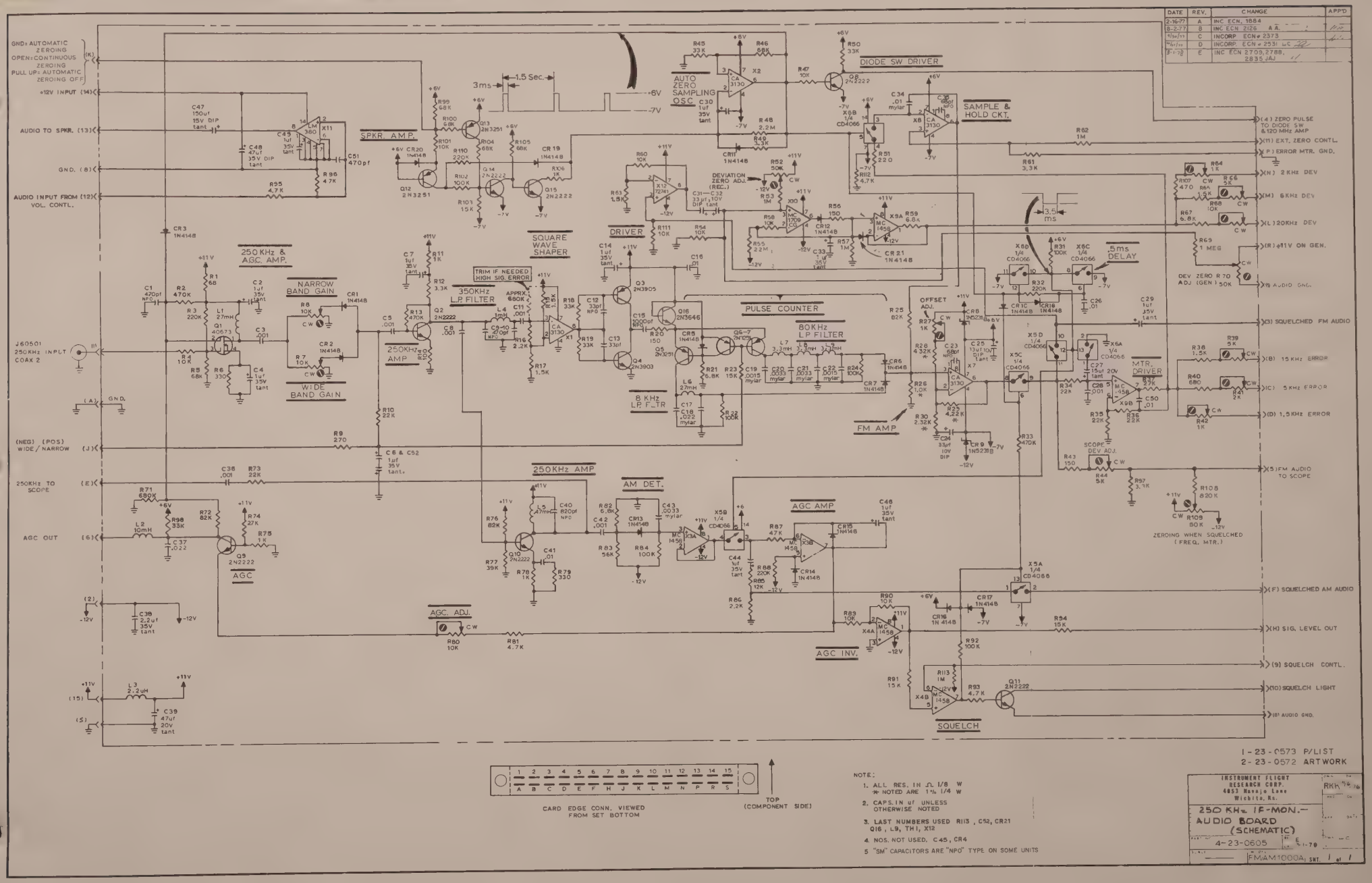
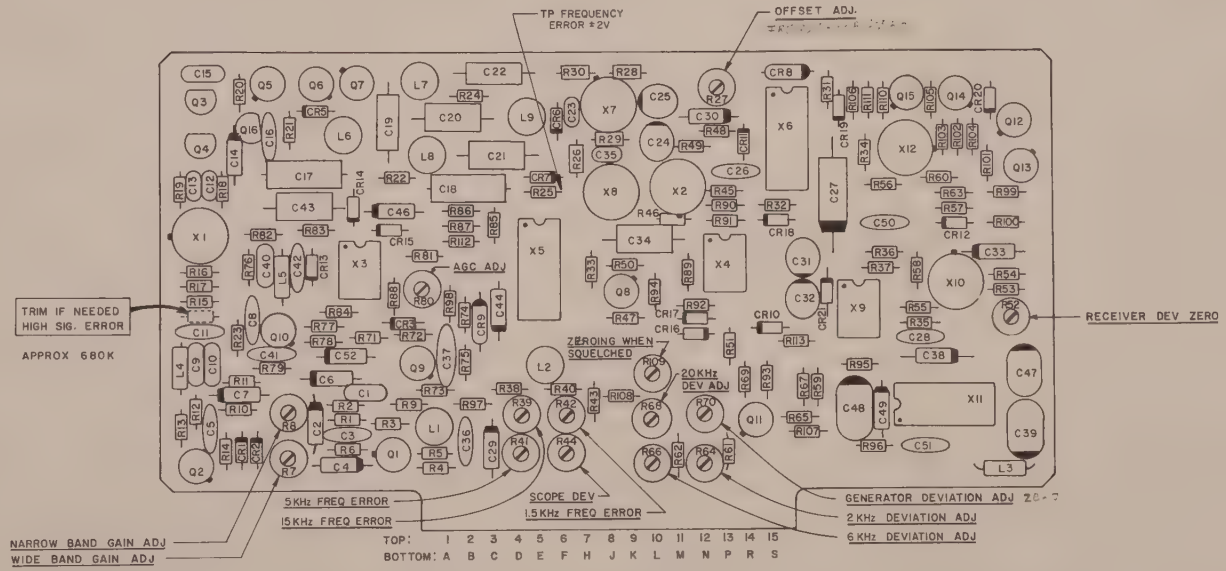

DATE | REV. | CHANGE | APP'D
2-16-77 | A | INC. ECN, 1884
8-2-77 | B | INC. ECN 2126
11-4-77 | C | INCORP. ECN # 2373
7-6-78 | D | INCORP. ECN # 2531
8-1-78 | E | INC. ECN 2709, 2788, 2835 JAJ
GND= AUTOMATIC ZEROING
OPEN= CONTINUOUS ZEROING
PULL UP= AUTOMATIC ZEROING OFF
+12V INPUT (14)
AUDIO TO SPKR. (13)
GND. (8)
AUDIO INPUT FROM (12) VOL. CONTL.
J60501 250KHz INPUT COAX 2
250KHz TO SCOPE (E)
AGC OUT (6)
(NEG) (POS) WIDE / NARROW (J)
SPKR. AMP.
250 KHz & AGC. AMP.
NARROW BAND GAIN
WIDE BAND GAIN
350KHz L.P. FILTER
250KHz AMP.
SQUARE WAVE SHAPER
TRIM IF NEEDED HIGH SIG. ERROR
DRIVER
AUTO ZERO SAMPLING OSC.
DEVIATION ZERO ADJ. (REC.)
DIODE SW DRIVER
SAMPLE & HOLD CKT.
PULSE COUNTER
80KHz L.P. FILTER
8 KHz L.P. FLTR
FM AMP
250KHz AMP
AM DET.
AGC AMP
AGC
AGC. ADJ.
AGC INV.
SQUELCH
OFFSET ADJ.
.5ms DELAY
MTR. DRIVER
SCOPE DEV ADJ.
DEV ZERO & 70 ADJ (GEN.) 50K
ZEROING WHEN SQUELCHED (FREQ. MTR.)
3ms
1.5 Sec.
3.5 ms
(4) ZERO PULSE TO DIODE SW & 120 MHz AMP
(11) EXT. ZERO CONTL.
(P) ERROR MTR. GND.
(N) 2 KHz DEV
(M) 6KHz DEV
(L) 120KHz DEV
(R) +11V ON GEN.
(A) AUDIO GND.
(3) SQUELCHED FM AUDIO
(B) 15 KHz ERROR
(C) 5KHz ERROR
(D) 1,5KHz ERROR
(5) FM AUDIO TO SCOPE
(F) SQUELCHED AM AUDIO
(H) SIG. LEVEL OUT
(9) SQUELCH CONTL.
(10) SQUELCH LIGHT
(B) AUDIO GND.
CARD EDGE CONN. VIEWED FROM SET BOTTOM
TOP (COMPONENT SIDE)
NOTE:
1. ALL RES. IN Ω 1/8 W * NOTED ARE 1% 1/4 W
2. CAPS. IN uf UNLESS OTHERWISE NOTED
3. LAST NUMBERS USED R113, C52, CR21 Q16, L9, TH1, X12
4. NOS. NOT USED. C45, CR4
5. "SM" CAPACITORS ARE "NPO" TYPE ON SOME UNITS
1-23-0573 P/LIST
2-23-0572 ARTWORK
INSTRUMENT FLIGHT RESEARCH CORP. 4853 Navaja Lane Wichita, Ks.
250 KHz IF-MON.- AUDIO BOARD (SCHEMATIC)
4-23-0605
FMAM1000A; SHT. 1 of 1

Figure 6-75

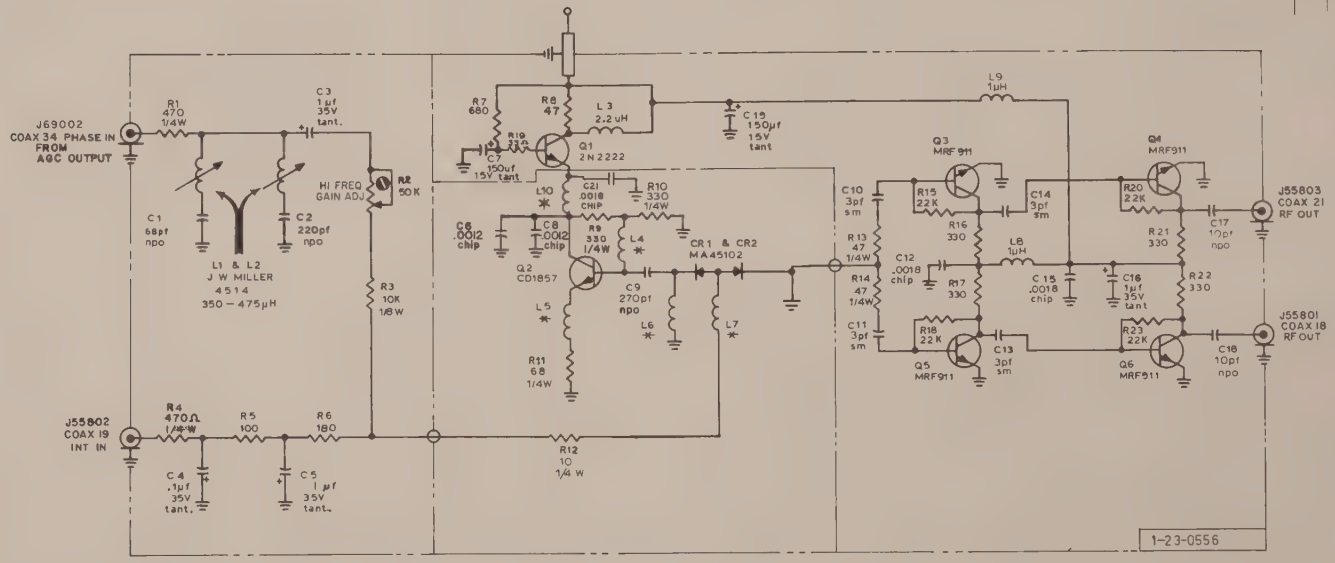

TP FREQUENCY ERROR ±2V
OFFSET ADJ.
TRIM IF NEEDED HIGH SIG. ERROR
APPROX 680K
AGC ADJ
ZEROING WHEN SQUELCHED
20KHz DEV ADJ
RECEIVER DEV ZERO
5KHz FREQ ERROR
15KHz FREQ ERROR
SCOPE DEV
1.5KHz FREQ ERROR
GENERATOR DEVIATION ADJ
2KHz DEVIATION ADJ
6KHz DEVIATION ADJ
NARROW BAND GAIN ADJ
WIDE BAND GAIN ADJ
TOP: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BOTTOM: A B C D E F H J K L M N P R S

PC BOARD # 2-23-0572
SCHEMATIC # 4-23-0605

PIN #	FUNCTION	PIN #	FUNCTION
15	+11 V	S	GROUND
14	+12 V INPUT	R	+11 V ON GEN
13	AUDIO TO SPEAKER	P	ERROR MTR GND
12	AUDIO INPUT FROM VOL CONTL	N	2 KHz DEVIATION
11	EXT ZERO CONTROL	M	6 KHz DEVIATION
10	SQUELCH LIGHT	L	20 KHz DEVIATION
9	SQUELCH CONTROL	K	GND= AUTOMATIC ZEROING OPEN= CONTINUOUS ZEROING PULL UP= AUTO ZEROING OFF
8	AUDIO GROUND	J	(NEG) (POS) WIDE / NARROW
7	N C	H	SIG LEVEL OUT
6	AGC OUT	F	SQUELCHED AM AUDIO
5	FM AUDIO TO SCOPE	E	250 KHz TO SCOPE
4	ZERO PULSE TO DIODE SW & 1200 MHz AMP	D	1.5 KHz ERROR
3	SQUELCHED FM AUDIO	C	5 KHz ERROR
2	-12 V	B	15 KHz ERROR
1	250 KHz INPUT	A	GROUND

Figure 6-76

DATE	REV	CHANGE	APPD
2-16-77	A	INCORP ECN #1943 DD	
5-4-77	B	INCORP ECN #2013 T.F	
7/27/77	C	INCORP. ECN # 2193 LvE DGW	
9/14/77	D	INCORP ECN # 2316 LvE	
2-1-78	E	INC ECN 2624 JRH	
7-11-78	F	INC. ECN # 2647 JRH	
7-11-78	G	INC ECN # 2869 LvE	



* L4, L5, L6, L7, L10 ARE 1-23-0597

NOTES:
1. ALL RESISTORS ARE 1/8 W 10% EXCEPT AS SHOWN.
2. ALL RESISTANCES ARE IN OHMS EXCEPT AS SHOWN
3. ALL CAPACITANCES ARE IN MICROFARADS EXCEPT AS SHOWN.

LAST USED NO'S.
C21
CR2
L8
Q6
R25

ITEM	REQ'D	PART NO	DESCRIPTION
			LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS ± .005 ANG ± 1°
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125 √
REMOVE ALL BURRS

APPLICATION

DRAWN 6-23-76

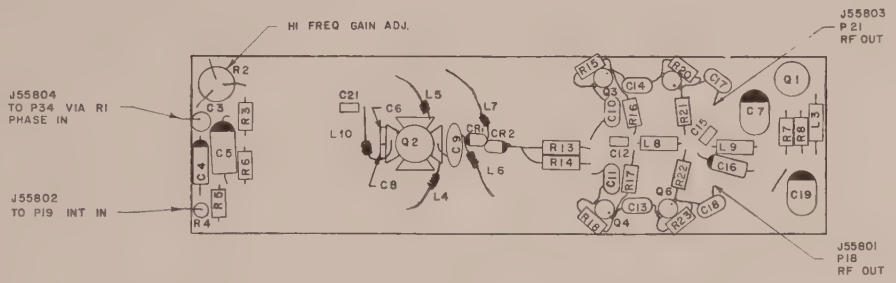
- IFR INC. -
WICHITA, KANSAS

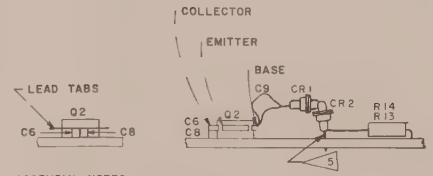
TITLE 1200-2200MHz OSC., BUFFER, TUNE SUMMATION SCHEMATIC

SIZE C | DRAWING NO 1-23-0556 | REV G

SHEET 1 OF 1

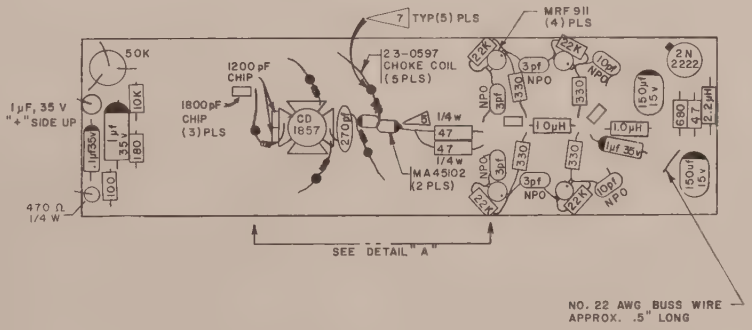
Figure 6-77





ASSEMBLY NOTES.

1. THE CHIP CAPACITORS MUST BE HANDLED WITH THE AID OF NON-METALLIC TWEEZERS, OR BY USING LEAD TABS
2. THE TWO CHIP CAPACITORS ARE MOUNTED AS CLOSE TO THE TRANSISTOR AS POSSIBLE AND BACK-TO-BACK, WITH THE LEAD TABS OF THE TWO CAPACITORS EXTENDING AWAY FROM EACH OTHER. TRIM LEAD TAB FLUSH WITH COLLECTOR AFTER CHIPS ARE MOUNTED.
3. C9 CAPACITOR IS MOUNTED IN A VERTICAL PLANE WITH ONE END ATTACHED AS CLOSE AS POSSIBLE TO THE TRANSISTOR (BASE LEAD TO BE AS SHORT AS POSSIBLE). THE OTHER LEAD OF C9 SHOULD BE APPROX. .25 SO THAT CR1 LEAD JOINT MAY BE VARIED DURING VCO ALIGNMENT
4. CR2 DIODE SHOULD BE MOUNTED APPROX. VERTICAL AND ON THE BUSS WIRE JUST ABOVE THE JUNCTION OF R13 AND R14 RESISTORS. CR1 & CR2 LEADS TO BE AS SHORT AS POSSIBLE.
5. THE LEADS OF THE FIVE COILS (23-0597) THAT ARE ATTACHED TO THE TRANSISTOR OR DIODE SHOULD BE AS SHORT AS POSSIBLE. SEE FLAG #7.



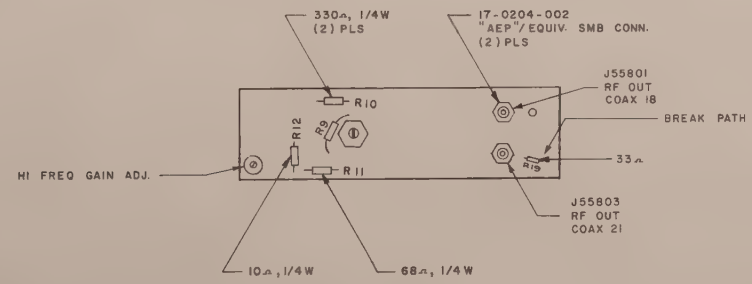
NOTES:

1. ALL RESISTORS ARE 1/8W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN µF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAXIMUM HEIGHT OF COMPONENTS TO BE .35 FROM COMPONENT SIDE OF BOARD.

△5 USE NO. 22 AWG BUSS WIRE TO CONNECT MA45102 DIODE & (2) 47Ω RESISTORS TO GROUND.

△6 FM√AM 1000A

△7 APPLY 1/16" DIA STRAND OF "G.E."/EQUIV. RTV FROM GROUND LEAD OF COIL TO SURFACE OF BOARD, APPROX. 1/8" FROM COIL.



ITEM	REQ'D	PART NO	DESCRIPTION
1	1	23-0559	1200-2200 MHz OSC PC BD ASS'Y

LIST OF MATERIALS

NEXT ASSY	23-0560
QTY	1
MODEL	16
APPLICATION	

TOLERANCES: UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH. DEC MAL'S .XX ± .010 .XXX ± .005. ANGLES ± 1/2°. FRACTIONS ± 1/64. SURFACE ROUGHNESS 125. REMOVE ALL BURRS.

DRAWN RKK 4 5 77 — CHECKED DW 4-14-77 — APPROVED

-IFR INC- WICHITA, KANSAS

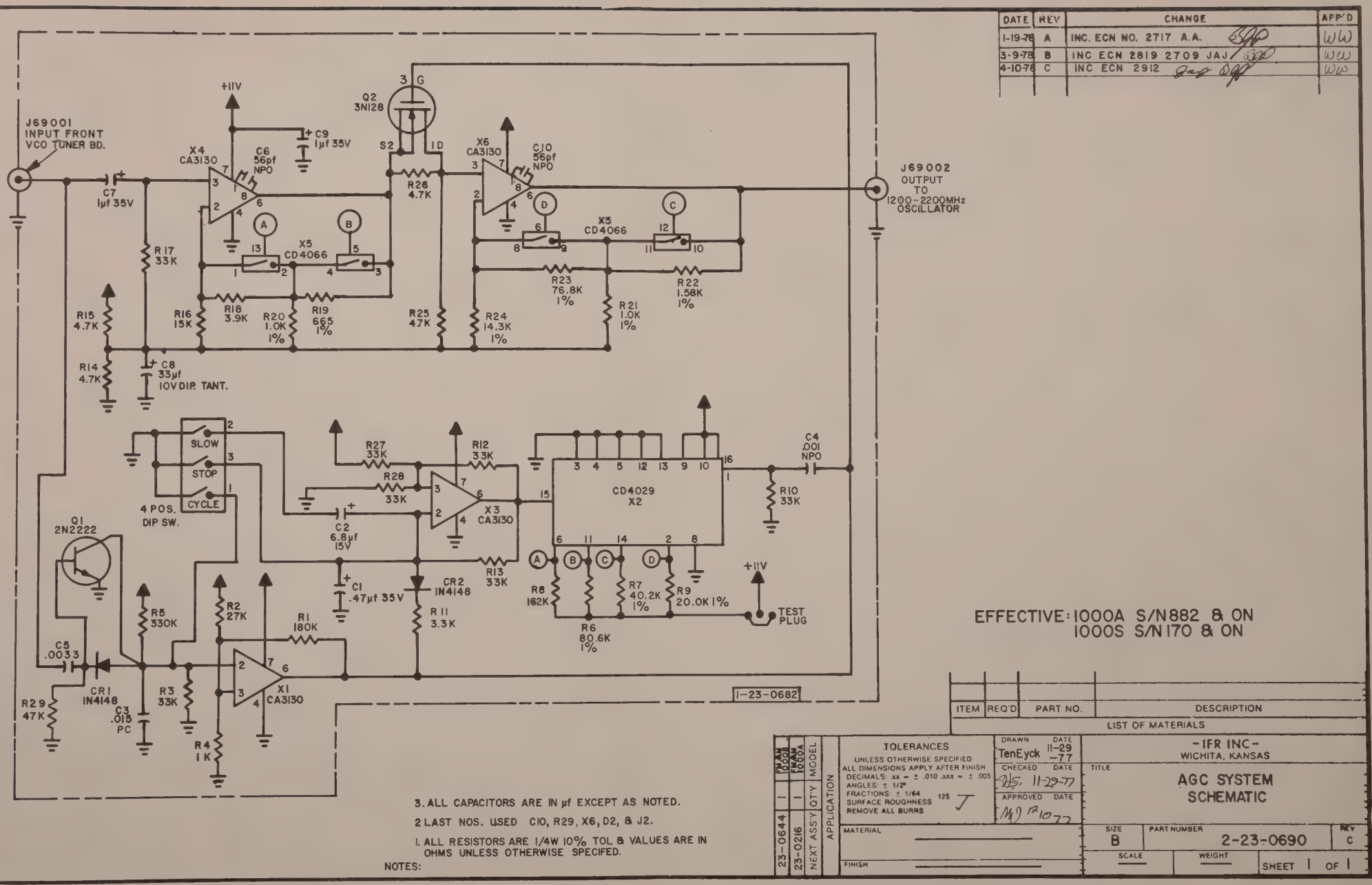
TITLE: 1200 - 2200 MHz OSCILLATOR P.C. BOARD ASS'Y

MATERIAL — FINISH

SIZE C — PART NUMBER 3-23-0559 — REV

SCALE 2:1 — WEIGHT UNOTED — SHEET 1 OF 1

Figure 6-78



DATE	REV	CHANGE	APP'D
1-19-76	A	INC. ECN NO. 2717 A.A.	WW
3-9-78	B	INC ECN 2819 2709 JAJ	WW
4-10-78	C	INC ECN 2912	WW

EFFECTIVE: 1000A S/N 882 & ON
1000S S/N 170 & ON

ITEM	REQ'D	PART NO.	DESCRIPTION

LIST OF MATERIALS

NOTES:

1. ALL RESISTORS ARE 1/4W 10% TOL & VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. LAST NOS. USED C10, R29, X6, D2, & J2.
3. ALL CAPACITORS ARE IN µf EXCEPT AS NOTED.

MODEL	QTY	NEXT ASSY	APPLICATION
1000S	1	23-0644	
1000A	1	23-0216	

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125 J
REMOVE ALL BURRS

DRAWN TenEyck DATE 11-29-77
CHECKED DATE 11-29-77
APPROVED DATE 12-10-77

MATERIAL
FINISH

-IFR INC-
WICHITA, KANSAS

TITLE
AGC SYSTEM
SCHEMATIC

SIZE B | PART NUMBER 2-23-0690 | REV C
SCALE | WEIGHT | SHEET 1 OF 1

Figure 6-79

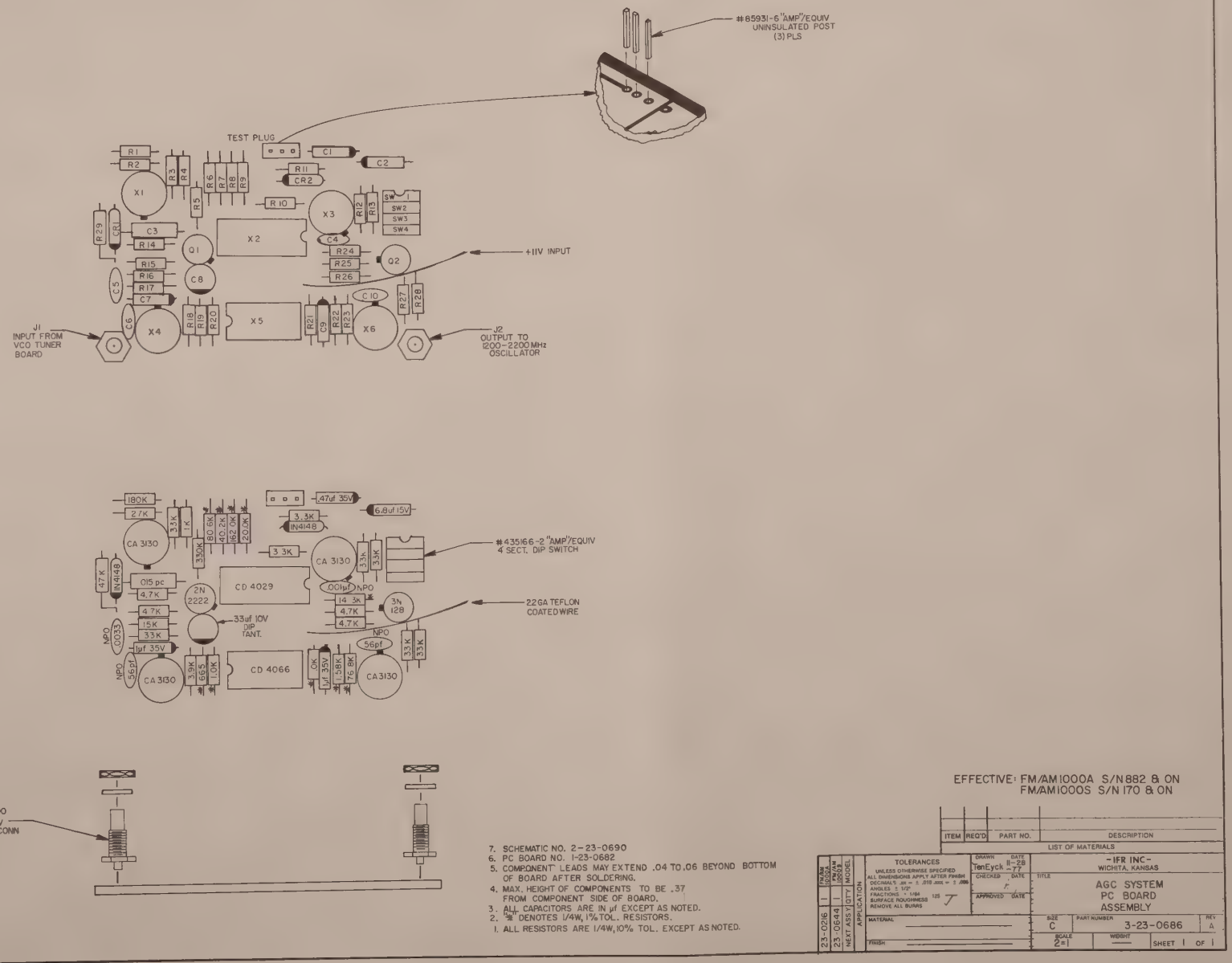
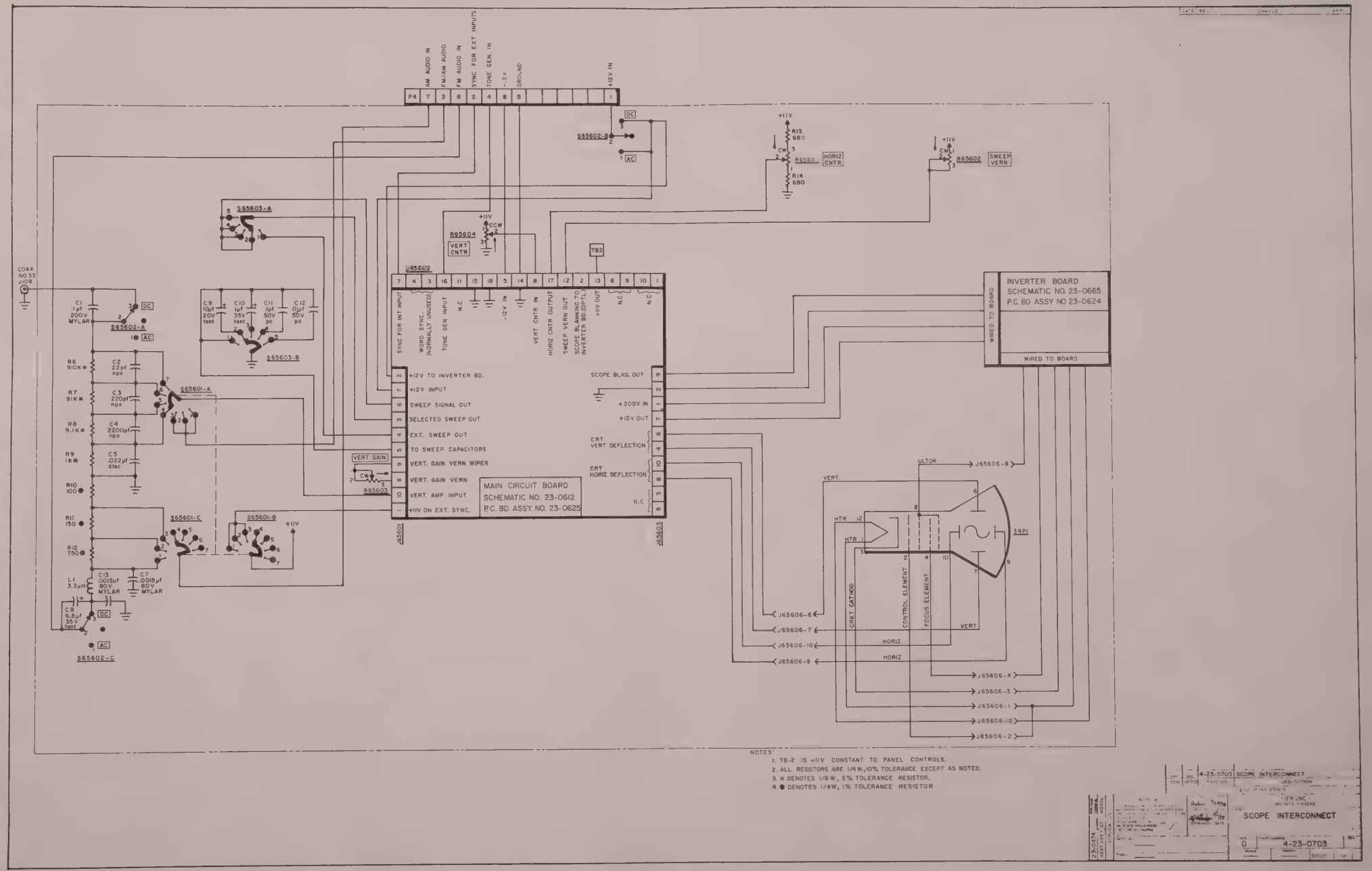

DATE
REV
CHANGE
APP'D
A
INC ECN 2912
#65931-6 "AMP"/EQUIV UNINSULATED POST (3) PLS
TEST PLUG
+11V INPUT
J1 INPUT FROM VCO TUNER BOARD
J2 OUTPUT TO 200-2200 MHz OSCILLATOR
#435166-2 "AMP"/EQUIV 4 SECT. DIP SWITCH
22GA TEFLON COATED WIRE
17-0204-000 "AEP" EQUIV SMB MALE CONN (2) PLS.
EFFECTIVE: FM/AM1000A S/N 882 & ON
FM/AM1000S S/N 170 & ON
7. SCHEMATIC NO. 2-23-0690
6. PC BOARD NO. 1-23-0682
5. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. MAX. HEIGHT OF COMPONENTS TO BE .37 FROM COMPONENT SIDE OF BOARD.
3. ALL CAPACITORS ARE IN µf EXCEPT AS NOTED.
2. * DENOTES 1/4W, 1% TOL. RESISTORS.
1. ALL RESISTORS ARE 1/4W, 10% TOL. EXCEPT AS NOTED.
ITEM
REQ'D
PART NO.
DESCRIPTION
LIST OF MATERIALS
TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS
DRAWN TenEyck 11-28-77
CHECKED
APPROVED
DATE
-IFR INC-
WICHITA, KANSAS
TITLE
AGC SYSTEM PC BOARD ASSEMBLY
MATERIAL
FINISH
SIZE C
PART NUMBER 3-23-0686
REV A
SCALE 2=1
WEIGHT
SHEET 1 OF 1
NEXT ASSY
QTY
MODEL
23-0216 1
23-0644 1
APPLICATION

Figure 6-80



NOTES:
1. TB-2 IS +11V CONSTANT TO PANEL CONTROLS.
2. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
3. * DENOTES 1/8 W., 5% TOLERANCE RESISTOR.
4. ● DENOTES 1/4 W, 1% TOLERANCE RESISTOR

4-23-0703 SCOPE INTERCONNECT

IFR INC.

SCOPE INTERCONNECT

D 4-23-0703

Figure 6-81

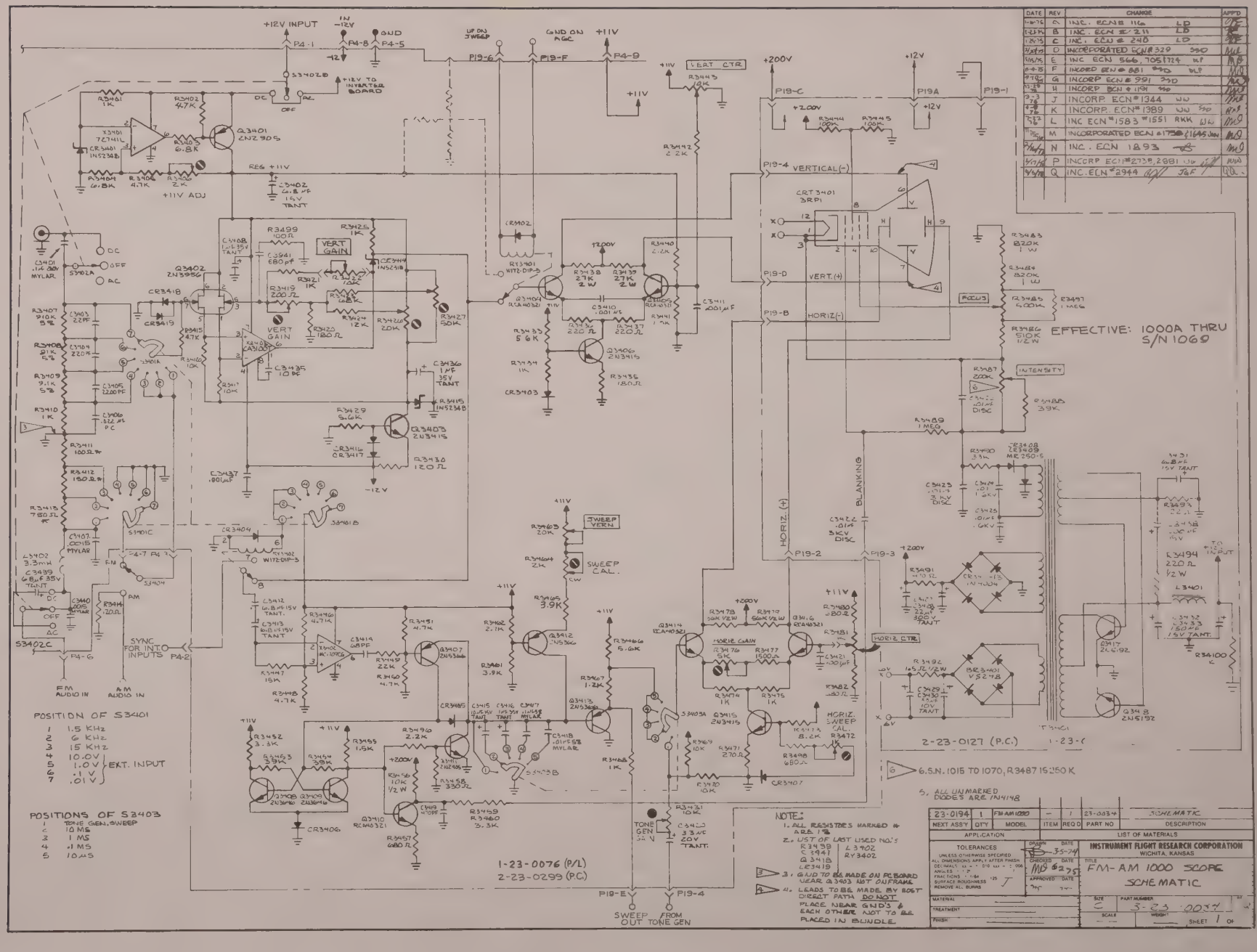

+12V INPUT
IN -12V
GND
P4-1
P4-8
P4-5
S3402B
+12V TO INVERTER BOARD
DC
AC
OFF
REG +11V
+11V ADJ
VERT GAIN
VERT CTR
VERTICAL(-)
VERT.(+)
HORIZ.(-)
HORIZ.(+)
FOCUS
INTENSITY
BLANKING
CRT 3401 3RP1
EFFECTIVE: 1000A THRU S/N 1069
SWEEP VERN
SWEEP CAL.
HORIZ GAIN
HORIZ CTR
HORIZ. SWEEP CAL.
TONE GEN
SYNC FOR INTO INPUTS
FM AUDIO IN
AM AUDIO IN
SWEEP FROM OUT TONE GEN
POSITION OF S3401
1 1.5 KHz
2 6 KHz
3 15 KHz
4 10.0V
5 1.0V
6 .1V
7 .01V
EXT. INPUT
POSITIONS OF S3403
1 TONE GEN. SWEEP
2 10 MS
3 1 MS
4 .1 MS
5 10 MS
1-23-0076 (P/L)
2-23-0299 (P.C.)
2-23-0127 (P.C.)
NOTE:
1. ALL RESISTORS MARKED # ARE 1%
2. LIST OF LAST USED NO'S
R 3499 | L 3402
C 3491 | RV 3402
Q 3418
LE 3419
3. GND TO BE MADE ON PC BOARD NEAR Q 3403 NOT ON FRAME
4. LEADS TO BE MADE BY BOST DIRECT PATH DO NOT PLACE NEAR GND'S & EACH OTHER NOT TO BE PLACED IN BUNDLE.
5. ALL UNMARKED DIODES ARE 1N4148
6. 6.5 N. 1015 TO 1070, R3487 IS 250 K
INSTRUMENT FLIGHT RESEARCH CORPORATION
WICHITA, KANSAS
FM-AM 1000 SCOPE
SCHEMATIC
23-0194 1 FM AM 1000 - 1 23-0334 SCHEMATIC
LIST OF MATERIALS
APPLICATION
NEXT ASSY QTY MODEL ITEM REQ'D PART NO DESCRIPTION
SIZE C PART NUMBER 3-23-0034
SCALE WEIGHT SHEET 1 OF

Figure 6-82

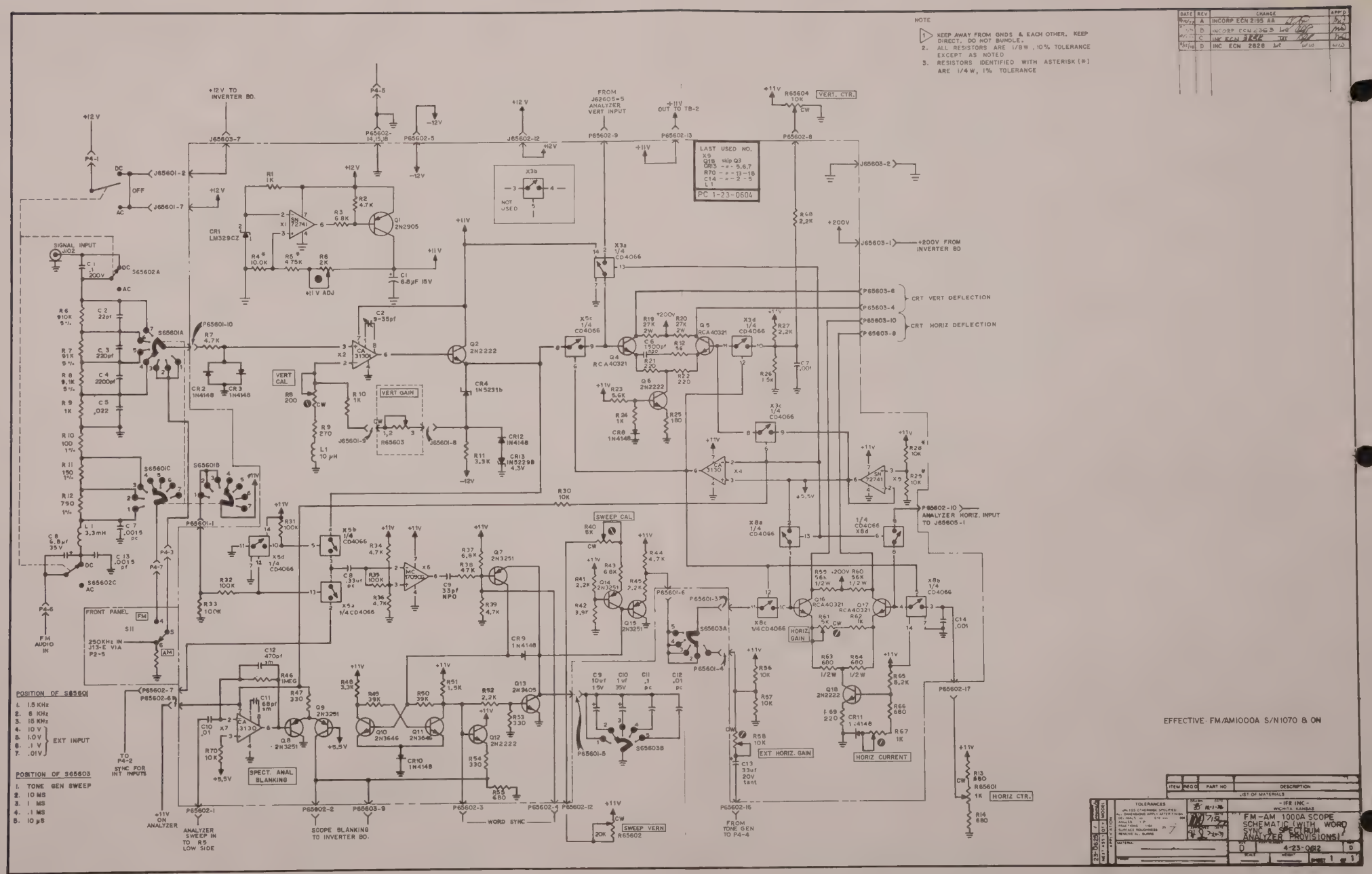
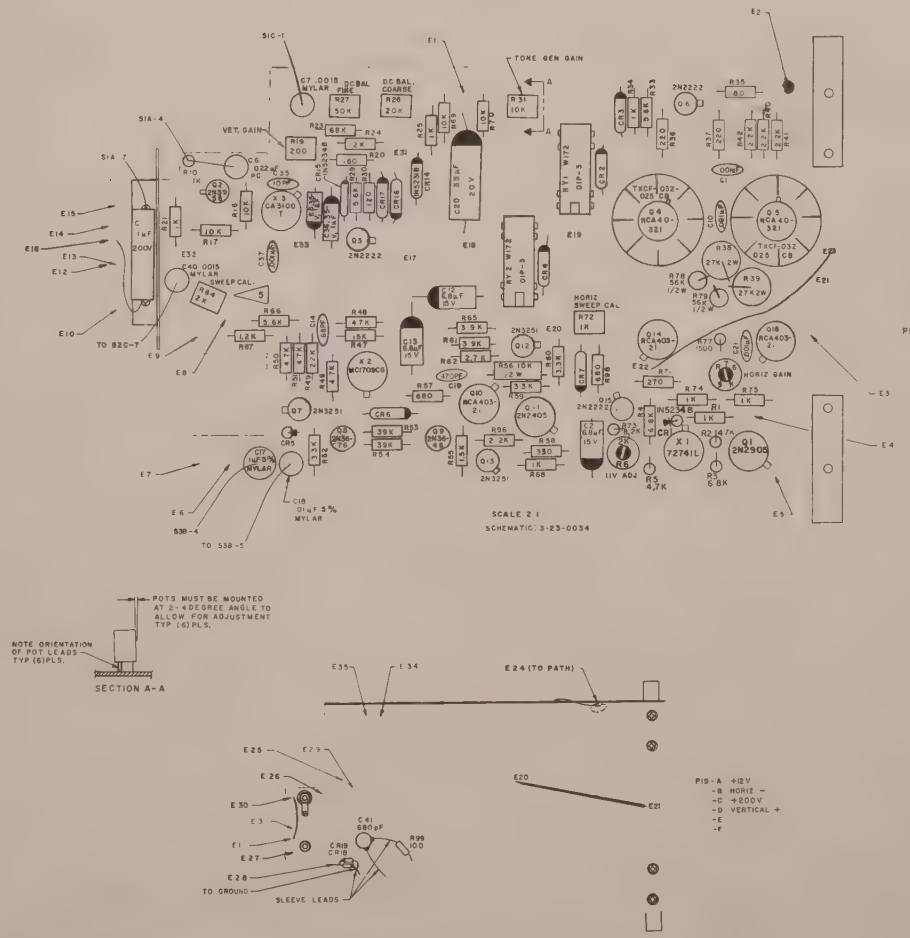

NOTE
1. KEEP AWAY FROM GNDS & EACH OTHER. KEEP DIRECT, DO NOT BUNDLE.
2. ALL RESISTORS ARE 1/8W, 10% TOLERANCE EXCEPT AS NOTED
3. RESISTORS IDENTIFIED WITH ASTERISK (*) ARE 1/4W, 1% TOLERANCE
DATE REV CHANGE APP'D
A INCORP ECN 2195 AS
B INCORP ECN 2363
C INC ECN 2828
D INC ECN 2828
LAST USED NO.
PC 1-23-0604
+12V TO INVERTER BD.
FROM J62605-5 ANALYZER VERT INPUT
+11V OUT TO TB-2
VERT. CTR.
+200V FROM INVERTER BD
SIGNAL INPUT
+11V ADJ
CRT VERT DEFLECTION
CRT HORIZ DEFLECTION
VERT CAL
VERT GAIN
SWEEP CAL
ANALYZER HORIZ. INPUT TO J65605-1
FRONT PANEL
FM AUDIO IN
250KHz IN J13-E VIA P2-5
POSITION OF S65601
1. 1.5 KHz
2. 6 KHz
3. 15 KHz
4. 10 V
5. 1.0V
6. .1 V
7. .01V
EXT INPUT
POSITION OF S65603
1. TONE GEN SWEEP
2. 10 MS
3. 1 MS
4. .1 MS
5. 10 µS
TO P4-2 SYNC FOR INT INPUTS
SPECT. ANAL BLANKING
+11V ON ANALYZER
ANALYZER SWEEP IN TO R5 LOW SIDE
SCOPE BLANKING TO INVERTER BD.
WORD SYNC
SWEEP VERN R65602
FROM TONE GEN TO P4-4
EXT. HORIZ. GAIN
HORIZ GAIN
HORIZ CURRENT
HORIZ CTR.
EFFECTIVE: FM/AM1000A S/N1070 & ON
- IFR INC -
WICHITA, KANSAS
FM-AM 1000A SCOPE SCHEMATIC (WITH WORD SYNC & SPECTRUM ANALYZER PROVISIONS)
4-23-0612

Figure 6-83



WIRE LIST					
TO	FROM	COLOR	AWG	LENGTH	REMARKS
E1	S3A-1	WHT	26	5.8	
E2	R43-2	WHT/VIO	26	12.5	VERT. CTR., LEAVE FREE
E3	R81-2	WHT/BLU	26	11	HORIZ. CTR., LEAVE FREE
E4	E10	RED	22	7.6	
E5	R43-1	WHT, RED	26	10	VERT. CTR., LEAVE FREE +11V
E6	S3B-3	C16	—	—	1μF 35V TANT POS TOWARD B0.
E7	S3B-2	C15	—	—	10μF 35V TANT " " "
E8	S1B-COM	WHT/RED	26	7	
E9	R63-2	BRWN/WHT	26	2.5	
E11	E30	BUS	26	8.5	
E12	S2A-2	RED	22	15	
E13	P4-1	RED	22	11.3	
E14	S2A-1	RED	22	15	
E15	S2B-1	YEL	22	5	
E16	S2B-2	YEL	22	5	
E17	S1B-1,2,3	GREY	26	4	S1B-1,2,3, CONNECTED IN SERIES
E18	P4-4	WHT/ORG	26	8.2	
E19	P4-2	GRN	26	8.3	
E20	E21	BUS	26	2.2	SLEEVE
E22	E23	BUS	26	1.8	SLEEVE
GRND	R43-3	BLK	26	11	VERT. CTR LEAVE FREE
E24	P4-9	RED/WHT	26	5.5	SYNC FOR INT. INPUTS
E25	S3A-5,4,3	WHT/GRY	26	2.4	S3A-5,4,3,2 CONNECTED IN SERIES
E26	S3-COM	YEL /WHT	26	3.5	
E27	S1A-7	BUS	26	4	SLEEVE
E28	S1A-COM	R-5	—	—	4.7K
E29	R63-	RED/WHT	26	3	
E31	S A 7	C	—	—	.1μF 200V MYLAR
E32	R22-1	YEL	26	2.7	
E33	R22-2	GRN/WHT	26	2.7	
E34	S3B-5	C18	—	—	.01μF 5% MYLAR
E35	S3B-4	C17	—	—	.1μF 5% MYLAR
P4-3	S1A-1	BLU	26	16.5	S1A-1,2,3 CONNECTED IN SERIES
P4-5	GRND	BLK	26	6.5	
P4-6	S2C-2	GRY	26	12.5	
P4-7	S1C-COM	VIO	26	13.5	
P4-8	E31	YEL	26	10.5	
GRND	S1C-1	C7	—	—	.0015μF MYLAR
S1C-1	S1C-2	R13	—	—	750Ω 1%
S1C-2	S1C-3	R12	—	—	190Ω 1%
S1C-3	GRND	R11	—	—	100Ω 1%
GRND	S1C-7	BUSS	26	4	S1C-7,6,5,4, ARE CONNECTED IN SERIES
S1C-1	S2C-1	L2	—	—	3.3mH
S2C-1	GRND	C40	—	—	.0015μF MYLAR
S2C-1	S2C-3	C39	—	—	6.8μF 35V POS TOWARD S2C-1
S2C-3	S2C-2	——	26	2	
S2A-3	E30	RED	22	15	
GND	S1A-4	C6, R10	—	—	.022μF, PC 1K
S1A-4	S1A-5	R9, C5	—	—	9.1K 3%, 2200PF
S1A-5	S1A-6	R8, C4	—	—	91K 5%, 220PF
S1A-6	S1A-7	R7, C3	—	—	910K 5%, 22PF
GRND	S3-GRND	——			

9. ALL UNMARKED DIODES ARE IN1418.
8. ALL COMPONENT LEADS CONNECTING TO SWITCH TERMINALS ARE SLEEVED.
7. SWITCH(3) CONSISTS OF ONE WAFER. (B) IS ON TOP HALF, (A) IS ON BOTTOM HALF. (SEE SWITCH DETAIL SHT. 2 OF 2)
6. SWITCH(1) CONSISTS OF TWO WAFERS, (A, B, C). (C) IS LOCATED ON FRONT OF FIRST WAFER. (B) IS ON BACKSIDE OF FIRST WAFER. (A) IS LOCATED ON SECOND WAFER.
5. TURN R64 POT AS SHOWN TO ALLOW FOR ADJUSTMENT.
4. REMOVE ALL UNUSED TERMINALS ON SWITCHES AND POTS.
3. ALL RESISTORS ARE 1/4 W, 10% TOL. EXCEPT AS NOTED.
2. ALL CAPACITORS ARE IN μf EXCEPT AS NOTED.
1. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.

NOTES:

EFFECTIVE: FM/AM1000A thru S/N1069

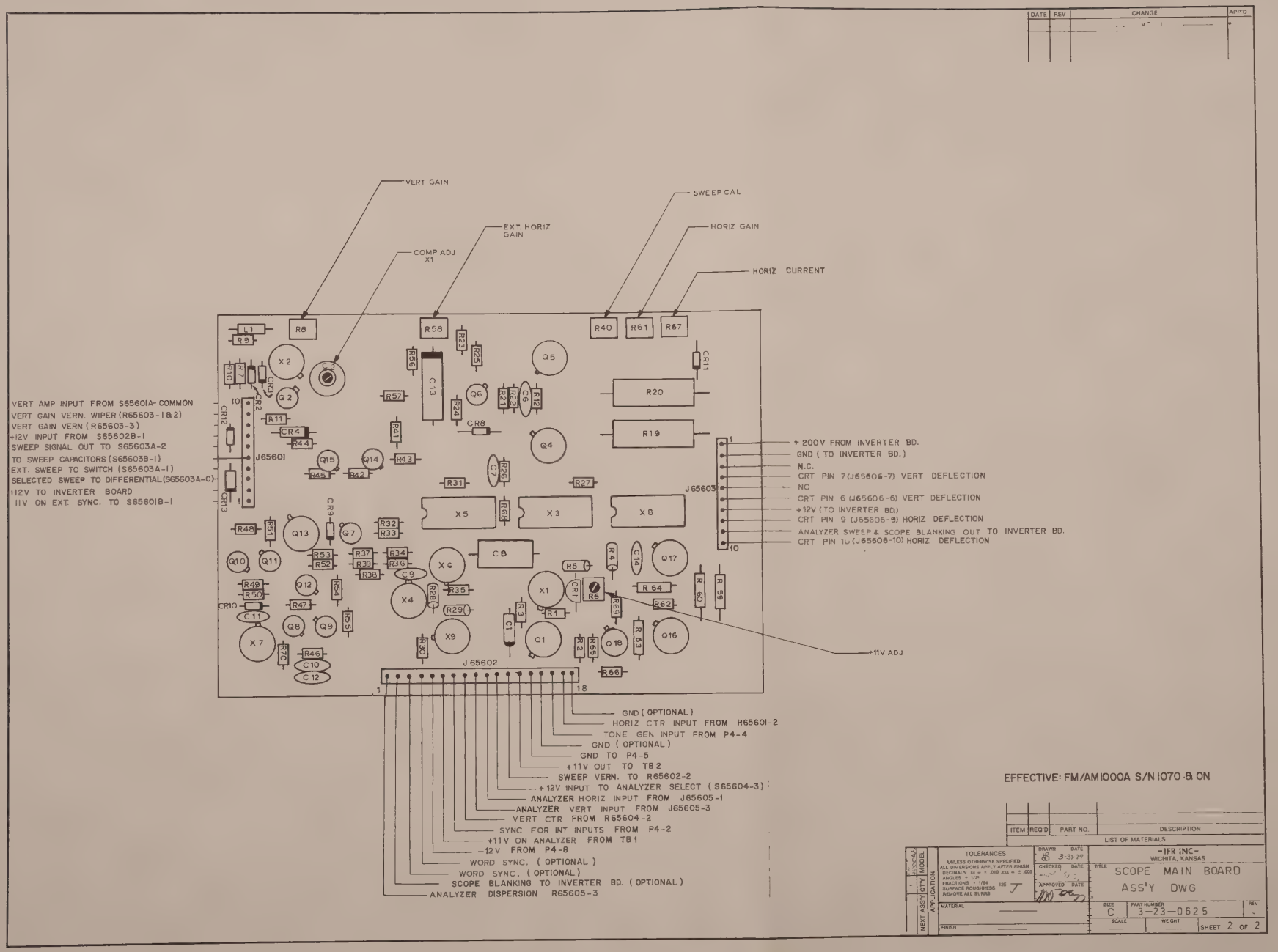
SEE SHT. 2

JRJ 2/6/78

SCOPE
PC BOARD ASS'Y.

D 4-23-0076 Y

Figure 6-84



EFFECTIVE: FM/AM1000A S/N 1070 & ON

ITEM	REQ'D	PART NO.	DESCRIPTION

LIST OF MATERIALS

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: XX = ± .010 XXX = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN 3-31-77
CHECKED
APPROVED

-IFR INC-
WICHITA, KANSAS

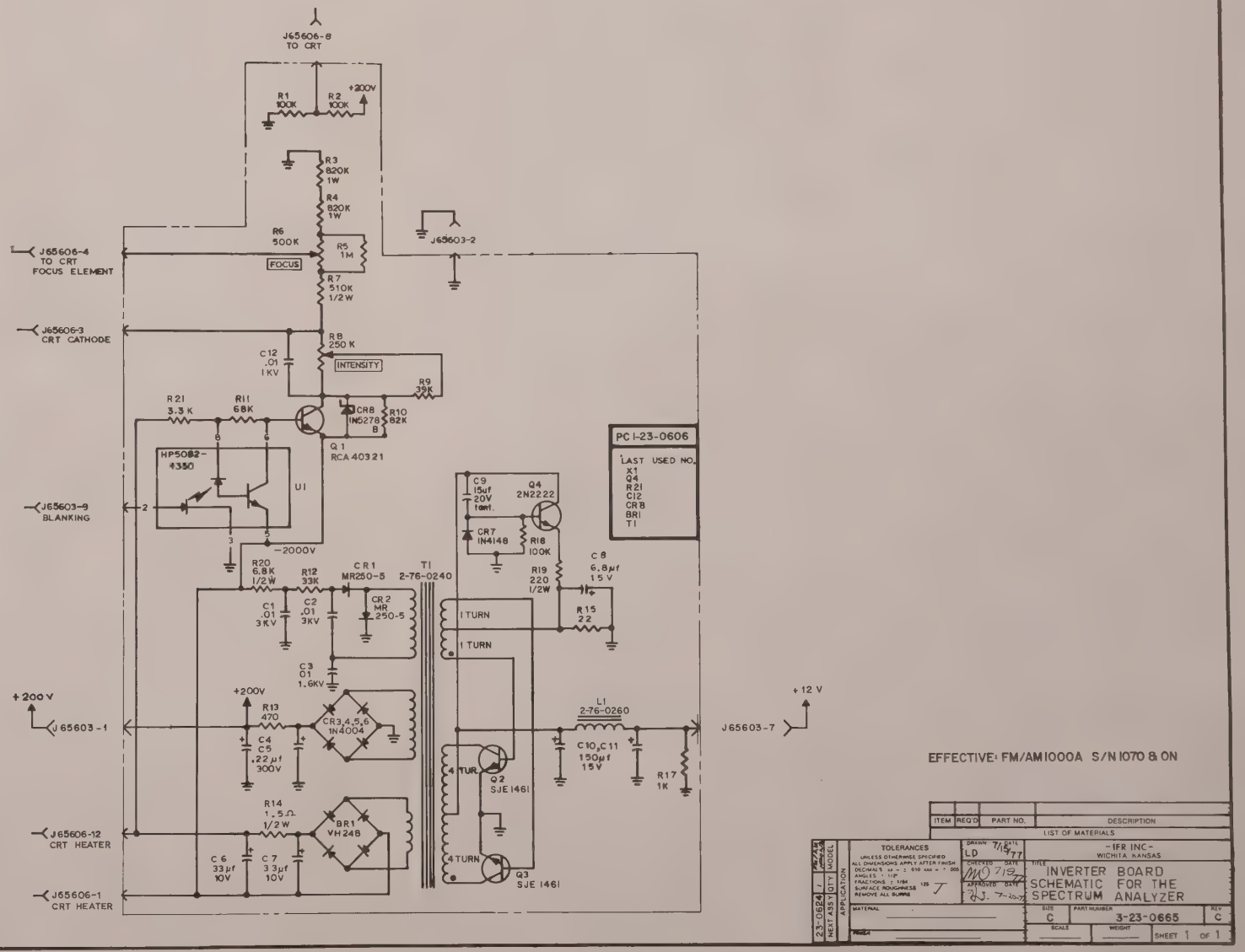
TITLE: SCOPE MAIN BOARD ASS'Y DWG

MATERIAL
FINISH

SIZE C | PART NUMBER 3-23-0625 | REV -
SCALE | WEIGHT | SHEET 2 OF 2

NEXT ASSY | QTY | MODEL | LOCAL APPLICATION

Figure 6-85



DATE	REV	CHANGE	APP'D
9/4/77	A	INCORP ECN # 2214 LC	MD
11/4/77	B	INCORP. ECN # 2330 LC	MD
2/24/78	C	INCORP ECN # 2430 LC	MD

EFFECTIVE: FM/AM1000A S/N 1070 & ON

ITEM	REQ'D	PART NO.	DESCRIPTION

LIST OF MATERIALS

NEXT ASSY 23-0624	QTY 1	MODEL 4245
APPLICATION		

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS .xx = ± .010 .xxx = ± .005
ANGLES ± 1/2°
FRACTIONS ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS
MATERIAL
FINISH

DRAWN LD 7/15/77
CHECKED MO 7/18/77
APPROVED JJ 7-20-77

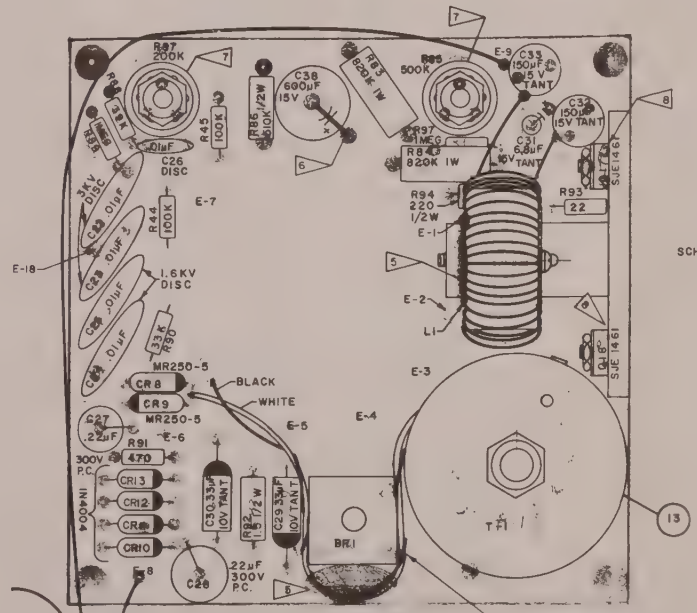
-IFR INC-
WICHITA, KANSAS

TITLE
INVERTER BOARD SCHEMATIC FOR THE SPECTRUM ANALYZER

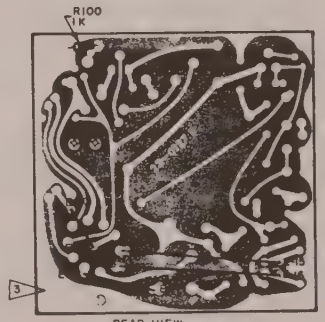
SIZE C | PART NUMBER 3-23-0665 | REV C
SCALE | WEIGHT | SHEET 1 OF 1

Figure 6-86

DATE	REV	CHANGE	APP'D
2-28-78	A	ORIGINAL RELEASE JAJ	

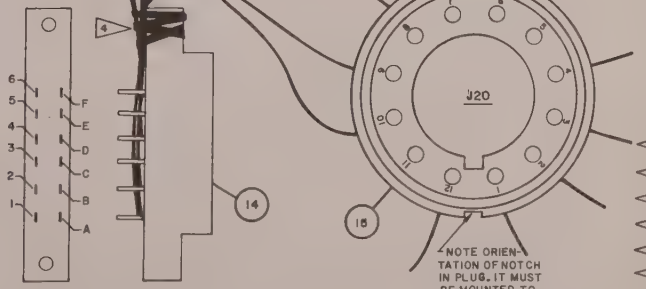


SCHEMATIC NO. 3-23-0034



WIRE LIST

TO	FROM	AWG	LENGTH	COLOR	REMARKS
E-1	J20-4	26	2.5	YELLOW	
E-2	J20-3	26	2.5	GRN/WHT	
E-3	J20-2	26	2.5	GRY/WHT	
E-4	J20-1	26	2.5	GREEN	
E-5	J20-12	26	2.5	BROWN	
E-6	J19-C	26	5.5	ORG/WHT	+200V
E-7	J20-8	26	2.5	ORANGE	
E-8	J19-1	22	4.0	BLACK	GROUND
E-9	J19-A	22	10.0	RED	+12V
E-10	E-14	26	0.7	BUSS	SLEEVE
E-11	E-15	26	2.4	BUSS	SLEEVE
E-12	E-16	26	2.4	BUSS	SLEEVE
E-13	E-17	26	1.1	BUSS	SLEEVE
E-18	J19-3	26	6.0	ORANGE	BLANKING
J20-6	J19-4	26	6.5	VIO/WHT	VERT. −
J20-7	J19-D	26	6.5	VIOLET	VERT. +
J20-9	J19-2	26	6.5	BLUE	HORIZ. +
J20-10	J19-B	26	6.5	WHITE	HORIZ. −



NOTES

1. ALL RESISTORS ARE 1/4W, 10% TOL. EXCEPT AS NOTED.
2. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.

3. APPLY EVEN COATING OF 1A76 "HUMISEAL"/EQUIV. TO BOTTOM OF BOARD AFTER ASS'Y.
4. SECURE WIRES TO END OF PLUG, (J19), WITH TIE-WRAP.
5. APPLY RTV TO SHADED AREAS.
6. SLEEVE POSITIVE LEAD OF C38.
7. POT ASSEMBLYS R87 AND R85 MUST BE MOUNTED 90° TO BOARD.
8. APPLY SILICONE GREASE BETWEEN TRANSISTORS AND MTG. BRKT.

EFFECTIVE: FM/AM1000A thru S/N 1069

ITEM	REQ'D	PART NO.	DESCRIPTION
		SEE SHEET 2	

LIST OF MATERIALS

3-23-0130	1	FM1000A	
NEXT ASS'Y	QTY	MODEL	
	APPLICATION		

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS APPLY AFTER FINISH
DECIMALS: .xx = ± .010 .xxx = ± .005
ANGLES: ± 1/2°
FRACTIONS: ± 1/64
SURFACE ROUGHNESS 125
REMOVE ALL BURRS

DRAWN JAJ 2-28-78
CHECKED DATE
APPROVED DATE

-IFR INC-
WICHITA, KANSAS

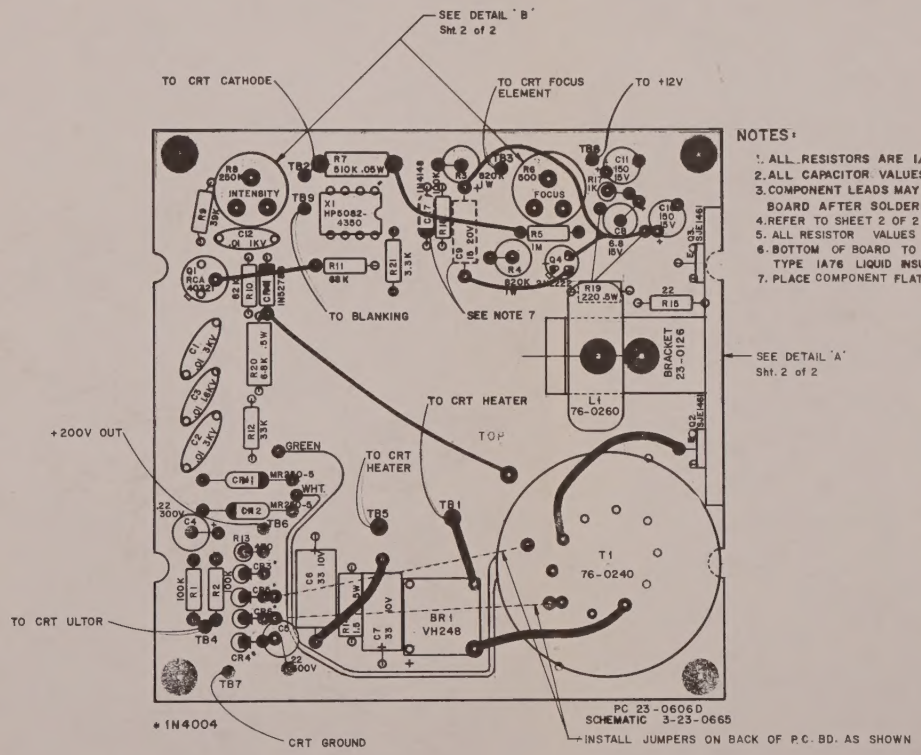
TITLE: SCOPE INVERTER PC BOARD ASS'Y.

MATERIAL
FINISH

SIZE C | PART NUMBER 3-23-0130 | REV R
SCALE 1:1 | WEIGHT | SHEET 1 OF 2

Figure 6-87

DATE	REV	CHANGE	APPD
6/21/77	D	REVISED & REDRAWN LC	MW
7/25/77	E	INCORP. ECN # 2389 LC	MW
8/31/77	F	INCORP. ECN # 2430 LC	MW
9/21/77	G	INCORP. ECN # 2468 LC	MW
11/21/77	H	INCORP. ECN # 2498 & 2525 LC	MW
1/24/78	J-1	INC. ECN # 2727 A.A.	WW
5-26-78	J-2	INC. ECN 2888 AA	WW



NOTES:

1. ALL RESISTORS ARE 1/4 W., 10% TOLERANCE EXCEPT AS NOTED.
2. ALL CAPACITOR VALUES ARE IN μF EXCEPT AS NOTED.
3. COMPONENT LEADS MAY EXTEND .04 TO .06 BEYOND BOTTOM OF BOARD AFTER SOLDERING.
4. REFER TO SHEET 2 OF 2 FOR PLUG WIRING & DETAIL INFORMATION.
5. ALL RESISTOR VALUES ARE IN Ω EXCEPT AS NOTED.
6. BOTTOM OF BOARD TO BE COATED WITH "HUMISEAL" / EQUIV. TYPE 1A76 LIQUID INSULATION.
7. PLACE COMPONENT FLAT ON BACK SIDE OF P.C. BOARD.

EFFECTIVE: FM/AM1000A S/N 1070 & ON

ITEM	REQ'D	PART NO.	DESCRIPTION
			LIST OF MATERIALS

23-0626 NEXT ASSY	1 QTY	23-0625 MODEL	APPLICATION

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS: xx = ± .010 xxx = ± .005 ANGLES: ± 1/2° FRACTIONS: ± 1/64 SURFACE ROUGHNESS 125 REMOVE ALL BURRS

DRAWN LC 8/31/77 CHECKED DATE APPROVED DATE 9/2/77

-IFR INC- WICHITA, KANSAS

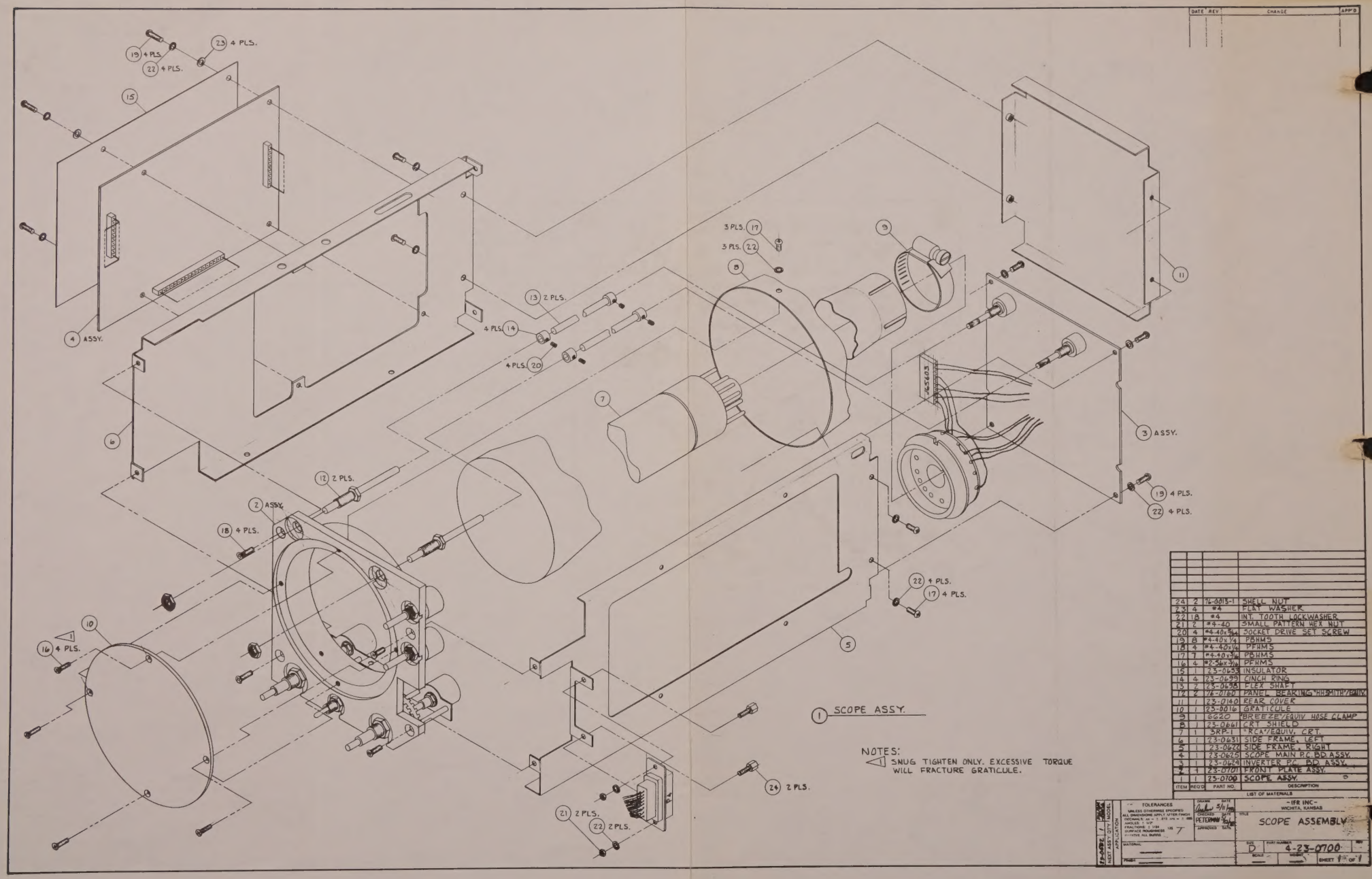
TITLE: SPECT. ANAL. INVERTER P.C. BOARD ASSY. FM/AM-1000S

MATERIAL: See L/M FINISH

SIZE C PART NUMBER 3-23-0624 REV J-2

SCALE 2 X WEIGHT SHEET 1 OF 2

Figure 6-88



ITEM	REQ'D	PART NO.	DESCRIPTION
24	2	76-0013-1	SHELL NUT
23	4	#4	FLAT WASHER
22	18	#4	INT. TOOTH LOCKWASHER
21	2	#4-40	SMALL PATTERN HEX NUT
20	4	#6-40 x 3/16	SOCKET DRIVE SET SCREW
19	18	#4-40 x 1/4	PBHMS
18	4	#4-40 x 1/4	PFHMS
17	7	#4-40 x 5/16	PBHMS
16	4	#2-56 x 3/16	PFHMS
15	1	23-0633	INSULATOR
14	4	23-0695	CINCH RING
13	2	23-0698	FLEX SHAFT
12	2	76-0180	PANEL BEARING THRU-SMTY/BULK
11	1	23-0140	REAR COVER
10	1	23-0016	GRATICULE
9	1	6660	BREEZE/EQUIV HOSE CLAMP
8	1	23-0661	CRT SHIELD
7	1	SRP-1	*RCA*/EQUIV. CRT.
6	1	23-0631	SIDE FRAME, LEFT
5	1	23-0672	SIDE FRAME, RIGHT
4	1	23-0675	SCOPE MAIN PC BD ASSY.
3	1	23-0674	INVERTER PC BD ASSY.
2	1	23-0701	FRONT PLATE ASSY.
1	1	23-0700	SCOPE ASSY.

LIST OF MATERIALS

TOLERANCES UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS APPLY AFTER FINISH DECIMALS .xx = ± .010 .xxx = ± .005 ANGLES ± 1° RADIUS .1" MAX SURFACE ROUGHNESS 125 FINISH ALL SURFS

DRAWN 5/11/79 CHECKED 5/11/79 PETERMAN 5/11/79 APPROVED DATE

MATERIAL

FINISH

-IFR INC- WICHITA, KANSAS

TITLE SCOPE ASSEMBLY

SIZE D PART NUMBER 4-23-0700 REV

SCALE WEIGHT SHEET 1 OF 1

NEXT ASSY SCOPE 1 PANEL

Figure 6-89

18 L 2

MP MASTER

MA26161